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# EJA

## European Journal of Anaesthesiology

Euroanaesthesia 2016
The European Anaesthesiology Congress

Abstracts Programme
London, United Kingdom, 28 – 30 May

Wolters Kluwer

*European Journal of Anaesthesiology*
Volume 33 | e-Supplement 54 | June 2016

# Abstracts and Programme

# EUROANAESTHESIA 2016

**The European Anaesthesiology Congress**

28 - 30 May 2016
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# European Journal of Anaesthesiology



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# EUROANAESTHESIA 2016

The European Anaesthesiology Congress

**LONDON, UNITED KINGDOM, 28 - 30 MAY 2016**

# ABSTRACT PRESENTATION PROGRAMME

Please note that all abstracts are presented as e-poster presentations: abstract presenters do not make a formal presentation of their abstract in a separate room, using audiovisual aids (except for the Best Abstract Prize Competition). Instead, two chairpersons will conduct, in front of each poster, a short discussion of each abstract with the presenter and the audience, for every abstract in that session. Poster presenters have been asked to stand by their poster for 45 minutes before and 30 minutes after their session, to address further questions.


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# ESA Best Abstract Prize Competition (BAPC)

## BAPC-1

### Respiratory complications in infants undergoing general anaesthesia: laryngeal mask airway versus endotracheal tube - a randomised controlled trial

von Ungern-Sternberg B.S.[1], Drake-Brockman T.[1], Zhang G.[2], Ramgolam A.[1]
*[1]University of Western Australia, Princess Margaret Hospital for Children, Department of Anaesthesia and Pain Management, Perth, Australia, [2]Curtin University, School of Public Health, Perth, Australia*

**Background and Goal of Study:** There is controversy in the paediatric anaesthesia community on which airway device to prefer in young children. Although laryngeal mask airways (LMA) are associated with reduced perioperative respiratory adverse events (PRAE) compared with endotracheal tubes (ETT), positioning of LMAs can be challenging in infants.
Therefore, it is often argued, the ETT may be a more reliable airway in infants since the airway is better secured. Thus we performed a randomised controlled trial evaluating the performance of both devices in infants. Primary endpoint of this RCT was the incidence of overall PRAE, while secondary endpoints were the occurrence and frequency of specific PRAE in the perioperative period.
**Materials and methods:** Following approval by the institutional research ethics committee (1786/EP, RA/4/1/5902) and trial registration (ACTRN12610000250033), patients, 0-12 months of age, undergoing elective general ± regional/local anaesthesia were approached. Exclusions were contraindications for LMA or ETT, cardiac disease, airway or thoracic malformations, midazolam premedication, and anticipated intraoperative fentanyl >1mcg/kg. Participants were randomised to receive LMA or ETT.
Planned recruitment included 290 children, with interim analysis at 145 with ongoing recruitment. Demographics, risk factors for PRAE and PRAE (defined as laryngospasm, bronchospasm, airway obstruction, desaturation <95%, severe persistent coughing, postoperative stridor) were recorded.
**Results and discussion:** Following interim analysis the trial halted at 181 patients since predefined stopping rules had been met. Group demographics (Group LMA 8(1-12) months, 8.2(2.9-12.8) kg, preterm 15.7%, group ETT 7.1(1-12) months, 7.7(2.3-12.5) kg, preterm 8.5%) and distribution of risk factors for PRAE were similar in both groups. PRAE occurred in 53.2% and 18.1% of patients who received an ETT vs LMA, respectively (OR 5.15, 95% CI2.58-10.28, p<0.001). Laryngospasm or bronchospasm occurred in 19.1% and 3.6% of patients for ETT and LMA respectively (OR 6.32, 95% CI 1.79-22.31, p=0.002).
**Conclusion(s):** In children undergoing minor elective procedures, the use of an LMA as compared with an ETT was associated with clinically significantly less PRAE. Particularly higher rates of laryngospasm and bronchospasm associated with the use of ETTs in infants compared with LMAs, have to be considered amongst other factors, when choosing the airway device for an individual child.

## BAPC-2

### Which anesthesia regimen is best to reduce morbidity and mortality in lung surgery? A multicentre randomized controlled trial

Bonvini J.M.[1], Neff T.[2], Stüber F.[3], Seeberger M.[4], Filipovic M.[5], Beck Schimmer B.[1]
*[1]University Hospital Zurich, Dept of Anaesthesiology, Zurich, Switzerland, [2]Kantonsspital Münsterlingen, Dept of Anaesthesiology, Münsterlingen, Switzerland, [3]University Hospital Bern, Dept of Anaesthesiology, Bern, Switzerland, [4]University Hospital Basel, Dept of Anaesthesiology, Basel, Switzerland, [5]Kantonsspital St. Gallen, Dept of Anaesthesiology, St. Gallen, Switzerland*

**Background:** One-lung ventilation (OLV) isolates individual lungs under general anesthesia; it is however associated with hypoxia-reoxygenation injury in the deflated and re-ventilated lung. Numerous studies have reported beneficial effects of volatile anesthetics on inflammatory mediators in this type of injury model. If volatile anesthetics are potent enough to have an impact not only on surrogate biomarkers, but also on clinical outcome still has to be determined. We therefore designed a multicenter randomized controlled trial (RCT) comparing propofol with desflurane anesthesia in patients undergoing lung resection surgery with OLV to asses differences in major complications.
**Materials and methods:** Five centers in Switzerland (University Hospitals of Zurich, Bern and Basel and the Kantonsspital of St. Gallen and Munsterlingen) participated in the RCT. Patients scheduled for elective lung surgery were randomly assigned to receive either propofol or desflurane as general anesthetic with pre-stratification for study site, major diseases (coronary heart disease, COPD, diabetes, chronic kidney disease) as well as pneumonectomy. Major complications according to the Clavien-Dindo score were defined as primary (hospitalization) or secondary (6 month follow up) endpoint comprising of re-interventions without (grade $III_A$) or with anesthesia (grade $III_B$), single-organ (grade $IV_A$) or multi-organ failure (grade $IV_B$) as well as all-cause mortality (grade V). Cox regression model was used, adjusting results for study site, age, pneumonectomy and major diseases.
**Results:** 486 patients were enrolled (6 drop outs, n=230 for each arm, randomized and analyzed). Demographics were similar in both groups. 111 patients (48%) had major surgery (thoracotomy, pneumonectomy) in the propofol, and 97 (42%) in the desflurane group. Duration of OLV, anesthesia and surgery were comparable in both groups. Incidence of major complications during hospitalization was 16.5% in the propofol while 13.0% in the desflurane group (HR for desflurane 0.75, 95%CI 0.46-1.22, p=0.24). Incidence of major complications within six months from surgery was 40.4% in the propofol while 39.6% in the desflurane group (HR for desflurane 0.95, 95%CI 0.71-1.28, p=0.71).
**Conclusions:** This is the first adequately powered multicenter RCT addressing the effect of volatile anesthetics on major complications after lung surgery. No significant difference between the two anesthesia regimens could be observed.

## BAPC-3

### Preoperative geriatric conditions as predictors of surgical outcomes in fourth-age patients

Pelavski Atlas A., De Miguel Negro M., Señas García L., Villarino Villa L., Alcaraz García-Tejedor G., Lacasta Fornells A.
*Vall d'Hebron University Hospital. Universitat Autonoma de Barcelona, Dept of Anaesthesiology, Barcelona, Spain*

**Background & Goal:** Preoperative risk & postoperative outcomes among the extreme elderly are both extensively debated issues. We aim to determine which conditions predict poor outcomes in this population.
**Materials:** Prospective observational study. We recruited all patients of 85 years and above admitted for any scheduled surgical procedure (excluding day-cases) between 2011-2015.
Apart from demographic data, we recorded preoperative comobidities, functional reserve (METS), nutrition and congnitive status (mini-nutritional assessment, mini-mental state examination), polypharmacy (>7 drugs), dependency (Katz index) and frialty with both Fried's phenotype (FP) and gait speed, a surrogate for frailty. The complexity of the procedure (COP) was graded from 1 to 3 according to the simplified J. Hopkins' criteria.
We studied 4 indicators of poor outcome: the primary endpoint was 30-day mortality. We also explored morbidity, prolonged hospital stay (PHS) and escalation of care in living conditions (ECLC). After a bi-variate analysis with $X^2$, Mantel & Hansel's and Fischer's test, we used logistic regression (LR) to develop a model for each outcome variable.
**Results and discussion:** 127 patients were included: median age 87 (85-96). Overall 30-day mortality was 8%; LR suggests 3 statistically significant predictors: malnutrition (OR/95%CI: 17.6/3-110), COP 3 (25.8/3-226), history of osteoporosis/pathological fractures (21.8/3-176).
Predictors for morbidity included ischemic cardiopathy (3.9/1-11), COP 3 (3.6/2-9), and a non-frail FP (0,3/0.1-0.8).
The model for PHS also comprised non-frail FP (0.3/0.1-0.8) along with COP 3 (3.4/1-9) and diabetes (3.3/1-8).
Finally, the variables independently related to ECLC were: slow gait (2.5/1-6), COP 3 (3.2/1-7) and hypertension (3/1-9).
Hence, large surgery (COP 3) was a factor present in all 4 models, and carried a high predictive weight. Moreover, every model had at least one geriatric variable such as malnutrition & frialty. The latter, or its surrogate indicated poor outcomes, whereas non-frail was a protective factor (OR<1).
Limitations: we had overestimated the mortality rate while calculating the sample size, therefore, the precision of the model for mortality is reduced, with broad 95%CIs.

**Conclusions:** The COP and geriatric variables tend to be overlooked in regular preoperative assessements, yet they are particularly relevant in the extreme elderly. Along with comorbidities these variables should be studied to help decision making.

## BAPC-4

### Sevoflurane, not propofol, during lung resection surgery reduces the incidence of postoperative pulmonary complications. A randomized controlled trial

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**Background and Goal of Study:** Recent studies report the immunomodulatory role of halogenated anesthetics during lung resection surgery (LRS) but fail to investigate differences in clinical practice with respect to prognosis. The main goal of the present study was to compare the effect of sevoflurane and propofol on the incidence of postoperative pulmonary complications (PPCs) in patients undergoing LRS. The difference in lung and systemic inflammatory response was the secondary objective.
**Materials and methods:** We designed a randomized controlled trial (NCT 02168751; EudraCT 2011-002294-29), approved by the local ethics committee. We included 180 patients undergoing LRS. All of the patients fulfilled the inclusion criteria. Patients were randomized to two groups depending on the anesthetic used (propofol or sevoflurane).
The patients were managed with the same anesthetic protocol. Double-lung ventilation was performed with the following settings: volume-controlled ventilation (VCV), tidal volume (Vt) 8 ml/kg, PEEP 5 $cmH_2O$, $FiO_2$ 0.4-0.5 and respiratory rate to maintain $EtCO_2$ 30-35 mmHg. One-lung ventilation (OLV) was performed by applying Vt 6 ml/kg, PEEP 5 $cmH_20$, permissive hypercapnia, and $FiO_2$ 0.6-1 to maintain $SaO_2$>90%. Fiberoptic bronchoalveolar lavage (BAL) was performed in both lungs before and after OLV for analysis of inflammatory markers.
Arterial blood was drawn for measurement of respiratory gases and the same inflammatory markers analysed in BAL at 5 time points: baseline (before OLV); 30 min after initiation of OLV; at the end of OLV; and 6 and 18h after surgery. Release of inflammatory markers was measured using Western Blot. The *t* test and the chi-square test were used for the statistical analysis.
We recorded postoperative care unit stay, hospital stay, mortality during the 1st month and year, and PPCs classified following the definition applied in the ARISCAT study.
**Results and discussion:** Expression of lung and systemic proinflammatory cytokines were more pronunced and 1styear mortality was higher in the propofol group than in the sevoflurane group ($p<0.05$). Pulmonary and systemic release of the anti-inflammatory cytokine IL-10 was less pronounced in the propofol group ($p<0.05$). More PPCs were detected in the propofol group (28.4% vs 14%, OR 2.44 [95% CI, 1.14-5.26]).
**Conclusion:** Our results suggest sevoflurane during LRS reduces the frequency of PPCs owing to its immunomodulatory role in the pulmonary and systemic inflammatory responses.

## BAPC-5

### Evaluation of ultrasonographic thyrohyoid distance measurement for prediction of difficult intubation and prediction of pediatric endotracheal tube size by ultrasonography

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**Goal:** Our aim was to evaluate ultrasonographic (USG) measurement of thyrohyoid distance to predict difficult intubation and compare ultrasonographically measured subglottic and glottic diameters with age-relying formulas for correct ETT size in pediatric patients.
**Method:** After ethics committee approval, 119 patients planned to be intubated for surgery, were included in study.
Patients were divided into three groups; Group I (1-2 years, n=38), Group II (3-5 years,n=46) and Group III (6-8 years, n=35).
Age, gender, height, weight, Mallampati scores were recorded. We performed USG measurements following midazolam administration in children older than five years and during sevoflurane induction in children younger than five years old. ETT (cuffed/uncuffed) was selected using age-relying formulas. We considered ETT size optimal when a leak was detected at 20-30cm $H_2O$ inflation pressures. If a resistance was felt in the subglottic region, the tube was exchanged with a smaller and was exchanged with a larger (0.5 mm) size if a leak occurred at inflation pressures lower than 20cm $H_2O$. Patients were evaluated with Intubation Difficulty Scale. We compared age-relaying formulas with USG subglottic measurements for the prediction of correct tube size.
**Results and discussion:** No significant difference was found between groups regarding gender, age, weight and height distributions. 5% of patients were below the 3rd percentile. Mallampati scores were recorded as I in 106 (89,1%) patients and II in 13 (10,9%) patients. Cormack-Lehane scores were I, II and III in 101(84,8%), 17 (14,2%) and III 1 (0,008%) patients respectively. Based on the IDS; in group I, 23 (60,5%) cases were easy, 14 (36,8%) cases were slight difficult, 1 (0,02) case was moderate/major difficult; in group II 38 (82,6%) cases were easy, 8 (17,4%) cases were slight difficult; in group III 26 (74,3%) cases were easy, 9 (25,7%) cases were slight difficult.
No significant difference was observed in terms of thyrohyoid distances in Group I and II between the easy and slightly difficult cases in contrast to Group III where a significant difference was observed with a Cut-off value for thyroid distance of 17,45 mm. ETT size was predicted correct with USG in 52.5% and with age relying formulas in 19.7% of cases.
**Conclusion:** Thyrohyoid distance measured by USG can be used to predict difficult intubation in children between 6-8 years and USG measurement of subglottic diameter predicted correct tube size better than age relying formulas.

## BAPC-6

### A novel proteomic analytic approach to identify potential biomarkers of perioperative acute kidney injury and failure

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**Background and Goal of Study:** Acute kidney injury (AKI) is very common after cardiac surgery with an incidence of up to 30% and severe AKI results in a 4-fold increase in mortality. There is demand for specific and sensitive kidney injury markers, which would lead to earlier postoperative diagnosis and treatment of AKI. We propose a novel systematic proteomic analytic approach for identifying serum markers of AKI. In this model isolated kidneys are perfused with crystalloid buffer on a Langendorff apparatus and are either exposed to ischaemia or not (control). Venous effluent samples, devoid of proteins other than the ones released from the tissue of interest, are collected for proteomic analysis.
**Materials and methods:** Adult male Sprague Dawley rats were used for the isolated perfused kidney (IPK) experiments. The right kidney was isolated and the renal artery and vein were both cannulated. Kidneys were extracted and perfused ex-vivo at 37ºC by gravity flow at a pressure of 100 mmHg. Kidneys were perfused through the renal artery with a Krebs buffer gassed with 95% oxygen and 5% carbon dioxide for 30 minutes after isolation, to washout any blood and serum proteins. After washout four kidneys were subjected to no flow ischaemia for 30 minutes (Ischaemia group), then re-perfused with oxygenated buffer and four kidneys underwent time matched oxygenated perfusion (control group). After 60 minutes from the start of perfusion venous effluent, samples from the renal vein were collected for proteomic analysis.
**Results and discussion:** Venous effluent samples in the ischaemia and control groups were analysed by proteomics; cystatin C and uromodulin were identified as potential biomarkers of renal ischaemia. Uromodulin is a protein of renal origin and was verified in the venous effluent samples by western blot. Cystatin C is found in all tissues and is a known functional biomarker of AKI.
**Conclusion:** The aim of this study was to identify specific and sensitive serum biomarkers for perioperative AKI. Uromodulin was identified as one potential renal specific serum marker in the IPK model, as described above. These results may now be helpful for further assessments of serum markers in patients with postoperative AKI.
**Acknowledgements:** This study was funded in part through a British Journal of Anaesthesia and Royal College of Anaesthetists project grant (BJA/RCoA-NIAA2014R1).

# General Anaesthesiology

## 01AP01-1

### Pharmacodynamic differences of rocuronium in immobilized ICU patients

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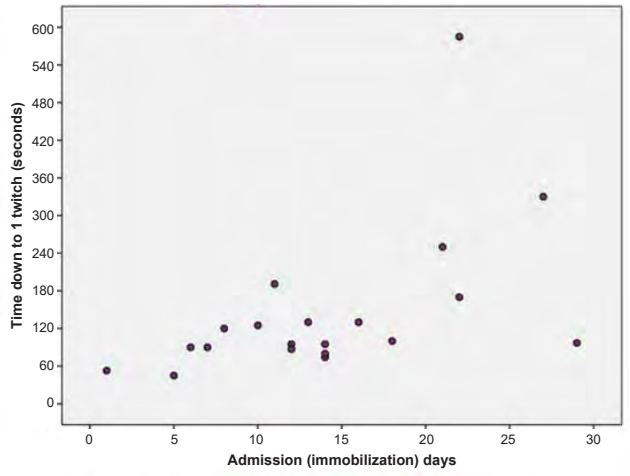
**Background:** Rocuronium is a non-depolarizing muscle relaxant with an onset time of 45-60 seconds when using 1.2 mg/kg. It has replaced succinylcholine for rapid sequence induction (RSI) in many countries, especially when there is a contraindication for succinylcholine, like prolonged immobilization. During immobilization an up-regulation of immature Acetylcholine receptors (AChRs) occurs mostly in the extra-junctional area which can cause hyperkalemia when stimulated by succinylcholine. Rocuronium is safe for these patients but the increase in AChRs can have an important influence on onset time.
Our hypothesis is that the onset time is delayed and we tested it in 20 ICU patients who needed muscle relaxant for performing a percutaneous dilatational tracheostomy (PDT).
**Materials and methods:** In 20 ICU patients in need for a PDT the onset time of 1.2 mg/kg rocuronium was measured using a peripheral nerve stimulator (TOF-watch). Because 3 patients, being immobilized for more than 20 days, didn't achieve a full block with zero twitches, time to decrease to 1 twitch was used to evaluate a relation between immobilization time and onset time.
**Results and discussion:** Because the results were monotonically rather than linearly related the spearman-rho test was used which showed a correlation coefficient of .629 (Sig 2-tailed: .005). This implies a strong correlation (fig 1). When dividing the patients in 3 groups (immobilization days ≤ 7, 8-14 and ≥ 15 days) we found the onset time to be significantly different (Kruskal wallis .01), especially when comparing group 1 and 3 (Kruskal Wallis test .008).
No differences were found in age, BMI, admission Apache IV, actual sofa score, edema, temperature, pH and interacting co-medication except for use of sedation 12 hours prior to the PDT.




*[Figure 1. Onset time of 1.2mg/kg Rocuronium in relation to immobilization]*

**Conclusion(s):** When using rocuronium for RSI in immobilized patients one should consider a prolonged onset time and consider using a higher dosage than usual when aspiration risk is high.
**References:**
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## 01AP01-2

### Exploring the variability in response to rocuronium in routine clinical practice using GE-Navigator

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**Background and Goal of Study:** The variability of response to drugs used in anaesthesia, including neuromuscular blocking drugs (NMB) such as rocuronium(1), is often not appreciated by providers. Fixed-rate infusion regimes imply individual response is relatively constant(2). Commercial drug interaction displays such as GE-Navigator allow visualisation of the kinetics of several drugs including rocuronium in routine practice(3). When combined with use of qualitative NMB monitoring we can evaluate drug kinetics in real time.
The aim of this study was to explore the inter- and intra-patient variability in response to rocuronium in a wide range of routine clinical cases.
**Materials and methods:** New Zealand National Ethics Committee approval. Patients over 18yr undergoing surgery with planned use of >1 dose of rocuronium were eligible. NMB monitored using GE NMT module (mechnoSensor) with train of four (TOF) monitored every 20 sec. Rocuronium doses were entered into Navigator which calculates rocuronium effect-site concentration using models of Cooper and Laud. Rocuronium concentration at return of the second twitch (T2) of the TOF was used as an end-point .
We calculated the average rocuronium concentration at first return of T2 and used interquartile range (IQR) and Median Absolute Deviation (MAD) as measures of dispersion. For subjects with >1 rocuronium dose, we calculated the IQR & MAD of the concentrations at each return of T2.
**Results and discussion:** We have results from 31 subjects: 21F; 10M. Mean age 55 (SD18)yr; weight 86 (21)kg; BMI 31.3 (8.9)kg/m$^2$. Initial rocuronium range 0.30mg/kg - 0.85 mg/kg (mean 0.51mg/kg). 29 received >1 rocuronium dose.
First recovery to return of T2 occurred at a mean rocuronium concentration of 1.08 (sd 0.54)ng/ml; range 0.21 to 2.7ng/ml. IQR 0.74ng/ml and MAD 0.90ng/ml.
Mean IQR of individual responses was 0.14 (0.10)ng/ml & MAD 0.10 (0.06) ng/ml.
We saw no correlation between rocuronium concentration at T2 and age or weight.
**Conclusions:** Response to rocuronium varied significantly between subjects, reinforcing the need for NMB monitoring. The response of an individual is relatively constant.
Use of predictive drug models in combination with measures of effect, may facilitate pre-emptive, rather than reactive, drug dosing and simplify the use of relaxant infusions.
**References:**
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## 01AP01-3

### A Phase 1 infusion dose optimization study of ABP-700 in healthy adult volunteers targeting light to moderate sedation

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**Background and Goal of Study:** ABP-700 is a positive allosteric modulator of the $GABA_A$ receptor currently being developed for procedural sedation and general anesthesia. The primary goal of this study is to optimize dual-stage infusion doses of ABP-700 in combination with fentanyl (FEN) and remifentanyl (REMI) for use in procedural sedation.
**Material and methods:** This study was performed following ethics approval in accordance with the Declaration of Helsinki and in compliance with GCP

This open label dose optimization study of dual-stage 30min ABP-700 infusion regimens was performed in 56 subjects in combination with bolus FEN pre-treatment (n = 32) or REMI co-infusions (n = 24). A total of 8 cohorts of 4 or 8 subjects were completed. Doses were selected based on previous studies to produce sub-hypnotic through occasional deep sedative effect.
Safety assessments included clinical labs, hemodynamic, respiratory and adverse event (AE) monitoring. PD effect was measured using MOAA/S and the BIS monitor.
**Results and discussion:** Subjects were male (48%) or female (51%) and predominantly white (89%) with ages ranging from 18-55 years. ABP-700 was safe and well tolerated with the majority of AEs reported as mild. At the lowest dose tested, mild BIS deflections were recorded but not associated with clinical sedation effect. Escalating dose regimens demonstrated a steep dose dependent increase in sedation effect as measured by both BIS and MOAA/S. For subjects who were deeply sedated (MOAA/S <2), co-infusion of REMI resulted in apnea in 3 subjects but in none of the subjects receiving FEN pre-medication.
Recovery was rapid accross all cohorts tested with 100% of subjects fully recovered within 10min of infusion completion.
**Conclusions:** ABP-700 was safe and well tolerated at all doses tested. Dose dependent PD effect was observed with escalating doses of ABP-700. FEN or REMI administration did not significantly alter the profile of ABP-700. Respiration was generally well preserved with apnea events occurring infrequently in deeply sedated subjects receiving REMI. These data suggest that ABP-700 can safely produce levels of sedation ranging from light/moderate to deep and support the further exploration of ABP-700 in a procedural sedation setting.

## 01AP01-4

### Comparison of deep vs. moderate neuromuscular blockade on low-pressure pneumoperitoneum for laparoscopic cholecystectomy

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**Background and Goal of Study:** Clinical and experimental studies have reported outcome advantages of low-pressure (<9mmHg) vs. standard-pressure (12-14 mmHg) pneumoperitoneum for laparoscopic surgery. However, working with low-pressure pneumoperitoneum can limit working space and surgical conditions could be worse.
The aim of this study was to assess the influence of neuromuscular blockade(NMB) depth on performing low-pressure pneumoperitoneum laparoscopic cholecystectomy(LC)
**Materials and methods:** Randomized, double blinded clinical trial. Ninety patients scheduled for elective LC were randomly allocated into three groups: Group 1: low-pressure LC (8mmHg) with deep NMB (TOF 0, PTC <5);
group 2: low-pressure LC (8mmHg) with moderate NMB (TOF 1-3) and
group 3: standard-pressure LC (12 mmHg) with no NMB depth pre-determined (control group).
Three experienced surgeons (blinded to intraabdominal pressure (IAP) setting) performed all the surgeries and judged surgical conditions according to a 4-step scale (from 1-optimal to 4-not acceptable, the surgery cannot be performed in these conditions). Operating time and intraoperative complications were investigated. Rocuronium was used for NMB and sugammadex was used for reversal of NMB. Acceleromiography was used for NMB monitoring (TOF-WATCH-S).
**Results and discussion:** Group 3 showed statistically better surgical conditions (p=0.021 $Chi^2$) and a higher proportion of optimal conditions (p=0.007 $Chi^2$) than groups 1 and 2. No differences on surgical conditions (p=0.236 $Chi^2$) or operating time (p=0.737 t test) were observed between groups 1 and 2.
Four patients in group 1 and one patient in group 2 had bad surgical conditions (scoring 4) and IAP needed to be increased to 12 mmHg in order to perform the surgery (p=0.353 Fisher). No cases scoring 4 were observed in group 3.
No complications of bleeding or bile duct injury were observed, however the rate of gallbladder perforation was higher at low-pressure LC (groups 1 and 2) when compared to standard-pressure LC (group 3) (p=0.018 $Chi^2$).
**Conclusion(s):** We did not observe better surgical conditions when performing low-pressure LC with deep NMB compared with moderate NMB. The rate of bad surgical-conditions and complications, patients that needed to increase the IAP for performing the surgery and operating time were not different at both NMB levels. Surgical conditions were judged better when performing LC at 12 mmHg pneumoperitoneum than at 8 mmHg, unrelated to NMB level.

## 01AP01-5

### The effect of deep versus moderate neuromuscular block on postoperative respiratory function in bariatric laparoscopic surgery: a randomized, double blind clinical trial

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**Background and Goal of the Study:** In recent literature it is has been suggested that deep neuromuscular block (NMB) improves surgical conditions during laparoscopy. The effect of deep NMB on postoperative respiratory function was not investigated in laparoscopic bariatric surgery. We investigated the respiratory function after anaesthesia with deep NMB and moderate NMB. This study was funded by MSD.
**Materials and methods:** Eligible patients were >18 years of age and were obese (BMI>30kg/$m^2$) or morbidly obese (BMI>40kg/$m^2$) and scheduled to undergo laparoscopic gastric bypass surgery. Patients were stratified according to their BMI and evenly randomized over a deep NMB-group (rocuronium bolus and infusion maintaining a posttetanic count of 1-2, reversal with sugammadex 4mg/kg) and a moderate NMB-group (rocuronium bolus and top-ups maintaining a train-of-four count of 1-2, reversal with neostigmine 50$\mu$g/kg and glycopyrolate). Anaesthesia was induced and maintained with propofol and remifentanil. In both groups patients were extubated when the TOF-ratio was >0.9. The primary outcome measure was the postoperative pulmonary function assessed by peak expiratory flow (PEF), forced expiratory volume in 1 second (FEV1) and forced vital capacity (FVC) and measured with an electronic portable peak flow meter. Data are presented as mean±SEM.
**Results and discussion:** After IRB approval and obtaining informed consent, 60 patients were included in the study. After surgery, all the pulmonary function tests were considerably impaired in both groups when compared to baseline (see Table 1). There was no statistically significant difference in the decrease in PEF, FEV1 and FVC (expressed as % change from baseline) between the deep and the moderate NMB-group (51.3±6.0% *vs.* 51.5±3.5%; P=0.97, 45.2±6.9% *vs.* 48.8±3.6%; P=0.64, 51.9±3.1% *vs.* 49.0±4.2%; P=0.29, respectively). In the deep NMB-group, 2 patients required postoperative non-invasive CPAP *vs*. 1 patient in the moderate NMB-group (P=0.6). No patient needed reintubation after surgery.

| Pulmonary function tests | Deep NMB-group | | P-value | Moderate NMB-group | | P-value |
|---|---|---|---|---|---|---|
| | Pre-operative | Post-operative | | Pre-operative | Post-operative | |
| PEF (l/min) | 314±20 | 141±15 | P<0.0001 | 276±15 | 126±0.1 | P<0.0001 |
| FEV1 (l) | 2.4±0.2 | 1.1±0.1 | P<0.0001 | 2.2±0.1 | 1.1±0.1 | P<0.0001 |
| FVC (l) | 3.0±0.2 | 1.4±0.1 | P<0.0001 | 2.7±0.1 | 1.2±0.1 | P<0.0001 |

*[Table 1. Pulmonary function tests]*

**Conclusions:** Pulmonary function is significantly impaired after laparoscopic bariatric surgery irrespective of the NMB-regime as long as NMB is adequately monitored and reversed at the end of surgery.

## 01AP01-6

### Assessment of effect of neuromuscular blockade level on surgical and peroperative conditions during low pressure laparoscopic cholecystectomy

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**Background and Goal of Study:** Neuromuscular blockade improves surgical space conditions in laparoscopic cholecystectomy performed during intraabdominal pressures lower than 12 mmHg. Adverse effects like abdominal pain, nausea, vomiting are seen less during low intraabdominal pressures. In the present study, the effects of deep neuromuscular blockade on surgical space conditions in laparoscopic cholecystectomy performed during low intraabdominal pressure were investigated.
**Materials and methods:** After the approval of the Instutional Review Board, sixty ASA 1-3 patients with BMI<35, aged 18-65 years old, scheduled for laparoscopic cholecystectomy were enrolled to the study. Patients were randomized into deep (Group D, n=20) and standart neuromuscular groups (Group S, n=20) and control group (Group C, n=20). Anaesthesia was induced with propofol 2 mg/kg, fentanyl 1 $\mu$g/kg and trachea was intubated after rocuronium 0,3 mg/kg in all patients. Inhalational anaesthetics were used for maintenance of anaesthesia. Neuromuscular monitoring was performed using TOF-Watch SX acceleromyograph. In group D additional rocuronium 0,3 mg/kg was administered after intubation and 0,3-0,6 mg/kg to maintain TOF 0, PTC<1. In Groups S and C additional rocuronium 0,15 mg/kg was administered if the surgical site was assessed as poor by the surgeon or in case of 25% recovery in TOF. The surgery was performed at 14 mmHg intraabdominal pressure in Group C, and at 8 mmHg in Groups S and D. Four point scale and NRS (numeric rating scale) were used to evaluate the surgical space conditions. Pain and nausea-vomiting were assessed postoperatively. Kruskal-Wallis test was used for statistical analysis.
**Results:** ASA score, BMI, BIS, arterial blood pressure and heart rate values were similar between groups. Surgery was completed at 8 mmHg intraabdominal pressure in 18 and 5 patients in Groups D and S, respectively. This difference was significant between Groups D and S. There was no difference between Groups C and D according to NRS and four point scale scores. These scores were significantly high in Group S compared to Group D (p<0,05).
**Discussion:** Deep neuromuscular blockade provides better surgical conditions in low pressure laparoscopic cholecystectomy operations compared to standard neuromuscular blockade. Operations can be performed during low intraabdominal pressure by providing deep neuromuscular blockade and the adverse effects of high pressures can be prevented.

## 01AP01-7

### Novel selective relaxant binding agent for the reversal of pipecuronium and rocuronium induced neuromuscular block

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**Background and Goal of Study:** Residual muscle relaxant effect at the end of surgery increases the risk of hypoxia, aspiration and pneumonia. Traditional reversal of relaxant effect with anticholinestherases may result in severe side effects and cannot be performed in deep levels of neuromuscular block. Reversal with sugammadex, the only clinically approved member of a new class of drugs called selective relaxant binding agents (SRBAs), is devoid of these limitations. However, high cost limits its use for routine reversal. Therefore, there is a need to develop cost effective SRBAs. We tested the efficacy of a novel compound, carboxymethyl-gamma-cyclodextrin (CMGCD), for the reversal of pipecuronium and rocuronium induced neuromuscular block and compared it to the efficacy of sugammadex in the rat hemidiaphragm-phrenic nerve model.
**Materials and methods:** In accordance with institutional ethics committee guidelines, male wistar rats were anesthetized with intraperitoneal pentobarbital and sacrificed with a bilateral thoracotomy and exsanguination. Then the left hemidiaphragm and associated phrenic nerve were excised. The muscle-nerve preparation was suspended in Krebs-buffer in a tissue holder that allowed independent electrical stimulation of the nerve and muscle. A strain gauge was attached to measure the contraction force of the diaphragm muscle after muscle relaxant and SRBA administration.
**Results and discussion:** Dose-response curves were created for pipecuronium and rocuronium. The half maximum effective concentration ($EC_{50}$) was 1.38 $\mu$M for pipecuronium and 7.5 $\mu$M for rocuronium. For the reversal of the effect of pipecuronium (90% single twitch depression) the $EC_{50}$ for sugammadex was significantly smaller than for CMGCD (0.67 $\mu$M vs. 10.14 $\mu$M; $p<0.0001$). In the case of rocuronium induced neuromuscular block, $EC_{50}$ for sugammadex was significantly smaller than for CMGCD (3.74 $\mu$M vs. 35.75 $\mu$M; $p<0.0001$). Given in equipotent doses, time kinetics for reversal of pipecuronium effect were not significantly different for sugammadex and CMGCD (mean lifetime of 96.80 s and 99.38 s, respectively; $p=0.174$).
**Conclusion(s):** In our *ex vivo* model CMGCD reversed the effect of pipecuronium and rocuronium. Sugammadex was more potent than CMGCD, but with equipotent doses similar recovery kinetics were obtained. Therefore CMGCD is a promising novel SRBA agent that should be further evaluated in live animal experiments.

## 01AP01-8

### Effect of dexamethasone on cisatracurium-induced neuromuscular block

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**Background and Goal of Study:** Chronic medication of glucocorticoid, such as prednisolone and betamethasone, influence the time course of neuromuscular block. There were, recently, reports that a single dose of DEXA 8mg, 2 to 3 hr prior to surgery, hastened the recovery profiles of rocuronium. However, there is lack of clinical reports on the DEXA effect of onset time and recovery profiles of cisatracurium. The aim of the present study was to compare the DEXA effect on the onset time and recovery profiles of cisatracurium in patients premedicated dexamethasone for prophylaxis of PONV according to the different injection time points.
**Materials and methods:** After institutional review board approval, a total of 117 ASA I and II patients undergoing general anesthesia were allocated and randomized using a random number table to 3groups, in which patients received DEXA 8mg intravenously 2-3 hours before induction of anesthesia (group A, n = 39), just before induction of anesthesia (group B, n = 39), or the end of surgery (group C, n = 39). General anesthesia was induced with the targeted effect-site concentration of propofol and remifentanil, followed 3 minute later by intubation without aid of neuromuscular blocking agents. Neuromuscular function was assessed by acceleromyography of the adductor pollicis during anesthesia maintenance with remifentanil and propofol. And then, all patients received cisatracurium 0.05 mg/kg. We measured and recorded the onset time; clinical duration, recovery index, recovery time and total recovery time.
**Results and discussion:** The onset time was significantly hastened in group A compared with group C (p = 0.000), but it was not significantly compared with group B (p =0.119). Recovery time and total recovery time were significantly hastened in group A compared with group B and group C
(p = 0.000 vs. P = 0.015, p = 0.000 vs. P = 0.08, respectively).
**Conclusion(s):** A single dose of DEXA 8mg hastened the onset time and the total recovery time of cisatracurium-induced block by about 15% and 9%,respectively, if administered 2 to 3 hours prior to surgery. Therefore, we have to pay attention to the possibility of an insufficient neuromuscular block in patients who require the higher dose of dexamethasone preoperatively and undergo surgery required deep neuromuscular block.
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## 01AP01-9

### Influence of acute normovolemic hemodilution on the potency and time course of action of rocuronium in rabbits

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**Background and Goal of Study:** We performed this study to evaluate the potency and time course of rocuronium-induced neuromuscular block following moderate or severe acute normovolemic hemodilution (ANH) in rabbits.
**Materials and methods:** Forty five rabbits were randomly assigned to the control (C) group, the moderate ANH (M) group, or the severe ANH (S) group. After stabilization of sevoflurane anesthesia, ANH was achieved by drainage of arterial blood and an intravenous infusion of 6% hydroxyethyl starch, during which hematocrit (Hct) decreased to 26.2 ± 2.5% in the M group and 17.6 ± 2.2% in the S group. We determined dose-response relationships of rocuronium in the three groups and created a time course of the action of 0.6 mg/kg rocuronium .
**Results and discussion:** The 50% effective dose ($ED_{50}$) for rocuronium was 45% and 50% lower in the M and S groups, respectively, than in the C group (50.9 ± 6.3 μg/kg) (P <0.001). The onset time after 0.6 mg/kg rocuronium was faster in the ANH groups compared with the C group (P <0.001). The duration of neuromuscular block was prolonged by 38% and 43% in the M and S groups, respectively, compared with the C group (49.1 ± 6.9 min) (P <0.001).
**Conclusion(s):** ANH resulted in high potency, rapid onset, and prolonged duration of rocuronium. However, the severity of ANH did not alter the potency and duration of action of rocuronium.
**Reference:**
Xue FS, Liao X, Liu JH, Zhang YM, An G, Luo LK. Influence of acute normovolaemic haemodilution on the dose-response and time-course of action of atracurium. Acta Anaesthesiol Scand 2000; 44: 163-9.

## 01AP01-10

### Comparison between TofScan® and TOF-WatchSX®: excellent correlation in measuring neuromuscular recovery

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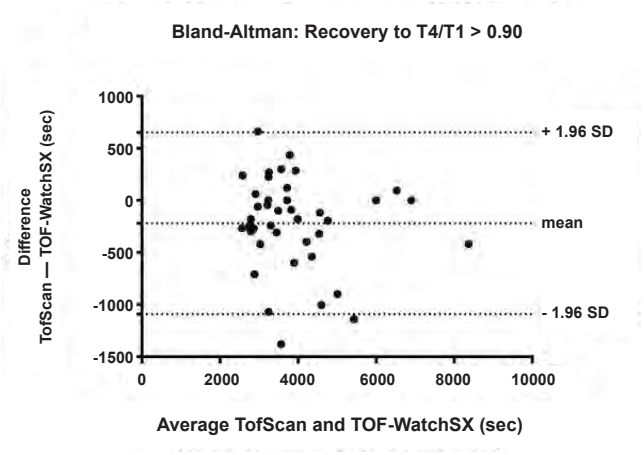
**Background and Goal of Study:** TofScan® is a new device dedicated to quantitative neuromuscular monitoring, based on a tridimensional piezoelement directly integrated in a hand-adapter. This should facilitate its use in clinical practice and reduce artefacts. As no comparison with the current reference device, i.e. the TOF-WatchSX® is available, we compared neuromuscular recovery of TOF-WatchSX® and TofScan®. The primary endpoint is the recovery of the train-of-four (TOF) ratio >0.9, secondary endpoints are recovery to 2 and 4 TOF responses, a TOF-ratio >0.25 and recovery to the initial control value.
**Materials and methods:** After ethics committee approval and informed consent, 41 patients were included and anaesthetized with a target-controlled infusion of propofol and remifentanil. Endotracheal intubation was facilitated with a single dose of 0.6 mg/kg rocuronium without reinjection. Neuromuscular block was assessed concomitantly with TOF-WatchSX® on one hand and TofScan® on the other; attribution to the dominant hand was done by randomization. We calculated sample size with a confidence level of 0.99, expected intraclass correlation of 0.9 and distance from correlation to limit of 0.09 for the intraclass correlation coefficient (ICC). The agreement between both measurement methods was compared by calculating ICC and a Bland-Altman analysis.
**Results:** Table 1 shows the ICC, fig 1 a Bland-Altman plot for TOF-ratio >0.9 and fig 2 median time of neuromuscular recovery.

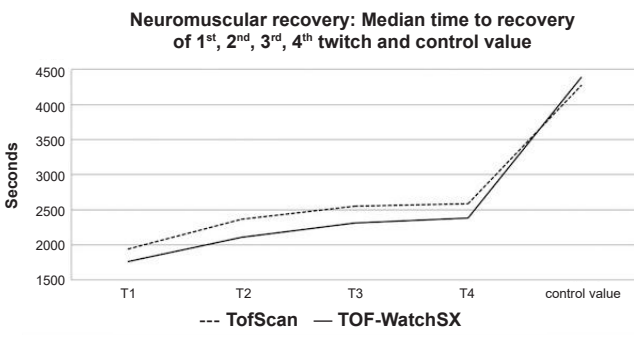
| | Recovery of T2 | Recovery of T4 | T4/T1 >25% | T4/T1 >90% | Recovery of control value |
|---|---|---|---|---|---|
| **ICC** | 0.797 | 0.809 | 0.904 | 0.929 | 0.969 |
| **CI 95%** | 0.646-0.887 | 0.669-0.894 | 0.830-0.947 | 0.873-0.961 | 0.942-0.983 |

ICC: Intraclass correlation coefficient; CI: confidence interval

*[Table 1]*




*[Fig 1]*




*[Fig 2]*

**Conclusion:** Based on their excellent correlation and reliability, neuromuscular recovery parameters measured by TofScan® and TOF-WatchSX® may be interchangeable.
**Reference:**
Anaesthesia 2009,64(1):82-9

## 01AP01-11

### Residual neuromuscular block a myth or a real risk

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**Background and Goal of Study:** Incomplete recovery of neuromuscular function may impair pulmonary and upper airway function and may contribute to adverse respiratory events in postanaesthesia care unit (PACU). The target of this study was to investigate the incidence of residual neuromuscular block, defined as Train of four (TOF)<0,9, in our PACU. Other outcome was to evaluate its association with critical respiratory events.
**Material and methods:** Prospective cohort study was set up in our PACU. During 2 months we studied 50 patients from 21 to 91 years old. Patients were submitted to scheduled non-cardiac, non-pulmonary and non-intracranial surgery. TOF were quantified on arrival to the PACU. Other outcomes we took in account were temperature, perioperative variables, critical respiratory events and use of reversal drugs and type (atropine + neostigmine (A/N) or sugamadex (SGMDX)).
**Results and discussion:** In 44% [IC95(0,3-0,58%)]of the cases reversal drugs were used, A/N in 72,7% [IC95%(63,7-81,7%)] and 27,3% [IC95(15,3-39,3%)] use SGMDX. TOF<0,9 were found in 42% [IC95(0,28-0,56%)], but if SGMDX was administered any of the patient presented residual neuromuscular block. 11 respiratory critical events happened, 7 of them had not received any reversal drug, 3 of them were treated with A/N and 1 with SGMDX. 10 of 11 respiratory critical events happened when TOF<0,9. If hypothermia was presented 66% [IC95(53-79%)] had a TOF<0,9 and all of extreme TOF values were reported in this group. Moreover, 9 of the 11 respiratory events happened in hypothermia.

**Conclusion and Discussion:** Residual neuromuscular block was a real problem in PACU and it was associated to most of critical respiratory events. Moreover, in hypothermia incidence of residual neuromuscular block was High.
We did not take in account the stay in the PACU and clinical course after PACU, so the morbi-mortality of our patient was unknown. We did not know dosage of opioids during surgery or in the PACU, so its influence in respiratory events it was also unknown.
**Learning points:** Respiratory critical events were one of the most important complications in the PACU and might be associated to residual neuromuscular block. Hypothermia should be considered as a risk to respiratory critical events. TOF was an essential tool in the operating room, as pulse oximetry.

## 01AP02-1

### Reversal of neuromuscular block by sugammadex preserves airway reflexes better than that by neostigmine

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**Background and Goal of Study:** Residual neuromuscular blockade is a serious complication following the use of neuromuscular blocking drugs. Reversal of neuromuscular block is therefore recommended to ensure muscle function recovery. The aim of this study was to assess the restoration of protective airway reflexes after reversion of rocuronium-induced neuromuscular blockade either by sugammadex or neostigmine.
**Materials and methods:** After institutional approval and informed consent, 50 patients scheduled to undergo abdominal surgery under propofol-remifentanyl-rocuronium anaesthesia participated in our study.
All patients were given written description of the swallowing test preoperatively. Each patient was given 20ml of water to swallow 30min before anaesthesia induction. All of them swallowed these 20ml without coughing or drooling. Patients with difficulties in swallowing and neuromuscular diseases were excluded.
Patients were randomly allocated in two groups (A & B) of 25 patients each. The neuromuscular function was monitored using accelerometry (TOF-Watch SX). At the end of surgery and when response reached a TOF score of 2, all group A patients received sugammadex 2mgr/kg and all group B patients neostigmine 0.05mgr/kg plus atropine 0.02mgr/kg. Anaesthesia drugs were discontinued and later on patients were extubated.
After extubation, each patient was checked for appropriate response to command. Ten minutes after each patient responded appropriately to command, he/she was asked to swallow 20ml of water. The swallowing was deemed to be successful if there was neither coughing nor drooling. If it was unsuccessful, the patient repeated the test at 15, then at 20, 25 and finally 30min until successful swallowing.
**Results and discussion:** The demographics did not differ between the two groups.
At 10 min after responding to command 24/25 patients given sugammadex and 10/25 patients given neostigmine drank the 20 ml of water without coughing or drooling ($p<0.001$)
At 15 min 25/25 given sugammadex and 16/25 given neostigmine drank the 20 ml of water without coughing or drooling ($p<0.002$)
At 20 min 25/25 given sugammadex and 22/25 given neostigmine drank the 20 ml successfully ($p=0.235$)
At 25 min all patients in both groups drank the 20 ml successfully.
**Conclusion:** Reversal of neuromuscular block by sugammadex results in earlier return of protective airway reflexes compared to that of neostigmine.

## 01AP02-2

### Reversal of neuromuscular blockade with sugammadex in type 2 diabetic patients

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**Background and Goal of Study:** There are very few studies on the pharmacodynamics of neuromuscular blockers in diabetic patients. Our goal was to analyze neuromuscular block reversal with sugammadex in type 2 diabetics compared with non-diabetic individuals, following rocuronium administration at usual doses.
**Materials and methods:** Prospective observational study. A total of 67 patients [33 diag- nosed with type 2 diabetes (T2DM group) and 34 non-diabetics (control group)] were enrolled. Muscle relaxation was induced with rocuronium at usual doses (0.6 mg/kg plus maintenance boluses of 0.15 mg/kg), and neuromuscular block was monitored through the surgical procedure. At the end of the operation, upon return of the second response (T2) to the train of four (TOF), sugammadex was administered at a dose of 2 mg/kg.
Primary endpoint: time from sugammadex administration to TOF ratio $\geq 0.9$ (T2-TOF90) and TOF ratio $\geq 0.7$ (T2-TOF70). Secondary endpoints: onset time,time to return of the first response (T1) to theTOF.
**Results and discussion:** No statistically significant differences($p=0.797$) in reversal with sugammadex (T2-TOF90) were recorded between T2DM group and control group (162.27s versus 156.32s).Likewise,there were no differences in the remaining pharmacodynamic variables analyzed (onset time,reappearance of T1 and T2-TOF70).
Considering that previous studies have shown an increased risk of residual neuromuscular block in diabetic patients, sugammadex, combined with careful monitoring of neuromuscular block and good dosing of the aminosteroid relaxant, can be very useful for preventing residual block.
**Conclusion(s):** Sugammadex reversal at usual doses in diabetic patients shows no differences versus general population. This drug is therefore useful for preventing residual neuro- muscular block in the diabetic population.
**References:**
1. Saitoh Y, Hattori H, Sanbe N,et al. Reversal of vecuronium with neostigmine in patients with diabetes mellitus. Anaesthesia 2004;59: 750-4.
2. Armendariz-Buil I, Lobato-Solores F, Aguilera-Celorrio L, et al. Residual neuromuscular block in type II diabetes mellitus after rocuronium: a prospective observational study. Eur J Anaesthesiol 2014;31: 411-6.
3. Nitahara K, Sugi Y, Shigematsu K, et al. Recovery of train-of-four ratio to 0.70 and 0.90 is delayed in type 2 diabetes with vecuronium-induced neuromuscular block.
Eur JAnaesthesiol 2013;30:80-4.

## 01AP02-3

### The interaction between sugammadex and dexamethasone in the rocuronium induced neuromuscular blockade in the rat hemidiaphrqgm preparation

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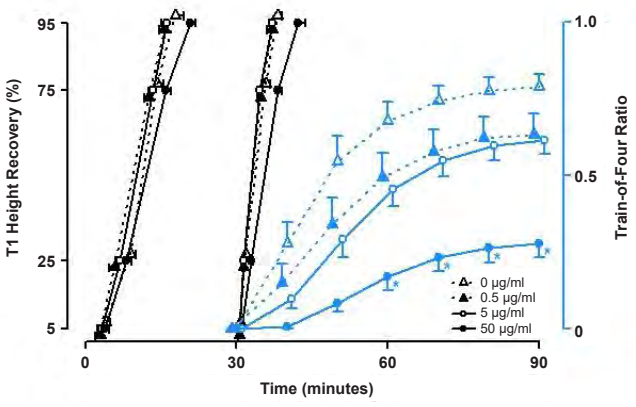
**Background and Goal of Study:** Sugammadex (Suga) reverses rocuronium-induced neuromuscular blockade (NMB) by encapsulating free rocuronium molecules in the plasma. Among drugs used in anesthesia, dexamethasone (Dexa) is frequently used for treating or preventing postoperative nausea, vomiting, and pain. Because the structure of Dexa is similar to that of steroidal NMB agents, Suga might bind Dexa rather than NMB agents. We investigated the effect of Dexa concentrations on Suga reversal.
**Materials and methods:** Rat phrenic-nerve hemidiaphragm preparations were allocated randomly into 12 groups ($n = 10$, each), and stimulated by train-of-four (TOF). After complete rocuronium-induced NMB had achieved,

Dexa (0, 0.5, 5, or 50 μg/ml) was added to the preparations, and Suga (a single, half-and-half q 30 min, or half-and-quarter q 30 min of rocuronium-equimolar Suga) was then added to reverse NMB. We measured TOF ratio (TOFr), recovery time to TOFr >0.9, T1 height, and recovery index for 60 min.
**Results and discussion:** Dexa 50 μg/ml delayed the recovery time to TOFr >0.9 in the case of half-and-half dose of Suga (*P <0.01, vs. 0, 0.5, 5 μg/ml).

| | | Dexa 0 ug/ml | Dexa 0.5 ug/ml | Dexa 5 ug/ml | Dexa 50 ug/ml |
|---|---|---|---|---|---|
| Single dose of sugammadex | Recovery time (min) to TOFr > 0.9 | 24.5±2.7 | 23.8±1.6 | 26.6±2.5 | 32.4±2.7 |
| Single dose of sugammadex | Recovery time (min) to 95% T1 height | 17.9±1.6 | 15.8±1.0 | 16.2±1.1 | 20.8±1.2 |
| Single dose of sugammadex | Recovery index | 5.3±0.5 | 6.9±0.6 | 6.5±0.7 | 7.8±0.5 |
| Half-and-half dose of sugammadex | Recovery time (min) to TOFr > 0.9 | 14.9±2.0 | 11.8±1.1 | 12.4±1.6 | 23.5±2.3* |
| Half-and-half dose of sugammadex | Recovery time (min) to 95% T1 height | 8.1±1.0 | 7.0±1.0 | 7.2±0.6 | 12.1±1.6 |
| Half-and-half dose of sugammadex | Recovery index | 3.9±0.7 | 3.4±0.4 | 3.2±0.2 | 5.3±0.7 |
| Half-and-quarter dose of sugammadex | TOFr at 30 minutes | 0.68±0.07 | 0.49±0.08 | 0.46±0.06 | 0.17±0.04* |
| Half-and-quarter dose of sugammadex | TOFr at 60 minutes | 0.79±0.04 | 0.63±0.07 | 0.62±0.05 | 0.28±0.05* |

*[Table 1. Data are expressed as mean±SEM]*

The recovery time to 95% T1 height and recovery index did not show significant difference even in various Dexa concentrations. In the experiment using a half-and-quarter dose of Suga, TOFr in the Dexa 50 μg/ml group was significantly lower than those in other groups until 60 min had passed (*P <0.01).




*[Fig. 1. Data are expressed as mean±SEM]*

**Conclusion(s):** High-dose Dexa pretreatment will delay a complete recovery from NMB with rocuronium-equimolar Suga, and suppress a recovery of TOFr with reduced dose of Suga. Therefore, neuromuscular monitoring and adequate dose of Suga is recommended in high-dose Dexa pretreated cases.

## 01AP02-4

### Sugammadex associated severe and persistent bradycardia. A complication to fear?

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**Background:** Sugammadex is a selective binding agent that ensures a safe, quick and effective reversal of neuromuscular block with rocuronium and vecuronium. However, hypersensitivity reactions and arrhythmias have been reported after its use, with bradycardia being an extremely rare complication[1]. Our case reports a severe and persistent bradycardia immediately following sugammadex administration.
**Case report:** A 55 year-old female patient, obese (BMI of 31 kg/m$^2$), classified as ASA II, underwent an emergent ureterorenoscopy due to symptomatic lithiasis. No history of heart disease or drug use was reported. The electrocardiography and blood tests were normal. Vital signs were stable immediately before the procedure. A balanced general anaesthesia was performed with ASA standard monitoring and BIS®. Induction: fentanyl (0.15 mg), propofol (200 mg), rocuronium (90 mg); maintenance: sevoflurane 2% (MAC-1). Vital signs were stable during the procedure. At the end of the surgery, 2 mg.Kg$^{-1}$ of sugammadex were administered after $T_2$ on TOF (*Train of Four*). After 2 minutes, she suddenly developed bradycardia (HR <30 bpm) resistant to 0,5 mg of atropine. Only when the atropine dose had reached 3 mg (in repeated boluses of 0,5 mg), the bradycardia recovered (HR - 70 bpm). The 12 lead electrocardiography and transthoracic echocardiogram were normal, before extubation. The postoperative period was uneventful and she was discharged at the third day.
**Discussion:** The mechanism that associates sugammadex with the occurrence of arrhythmias is still unclear. There are few literature reports[1,2] which correlate the occurrence of arrhythmias with the administration of this agent: auricular fibrillation, atrioventricular block, prolongation of the QT interval, one case of asystole following administration of 4 mg.Kg$^{-1}$ and another one of atropine resistant bradycardia similar to the one described. In our case, the bradycardia was most likely caused by the use sugammadex, since it occurred on a patient without history of cardiac disease or drug use and both electrocardiogram and blood biochemistry were normal.
**References:**
1. Bilgi M, *et al.* Int J Sci and Public Health. 2014; 3(3): 372-374;
2. Puhringer FK, *et al.* Anesthesiology. 2008;109(2):188-97.
**Learning points:** The patient's vital signs should be carefully monitored during and after the reversal of the neuromuscular blockade with sugammadex. If bradycardia occurs, treatment with atropine must be promptly carried out.

## 01AP02-5

### Does dexamethasone diminish sugammadex reversal of neuromuscular block?

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**Background and Goal of Study:** Sugammadex selectively reverses neuromuscular block (NMB), however, it can interact with other drugs, like glucocorticoids, by displacing or capturing them. These structurally resemble aminosteroid muscle relaxants and show potential for interference in the action of sugammadex, as previously shown in *in-vitro* biological models. A prospective single-blinded randomized clinical trial was designed to further explore the significance of these interactions.
**Materials and methods:** Sixty-five patients were included. NMB was assessed using repetitive train-of-four stimulation (TOF), with rocuronium used to maintain the desired NMB depth. NMB reversal of the TOF ratio to ≥0.9 at the end of anesthesia was achieved using sugammadex. The patients were randomized to control and dexamethasone (0.15 mg/kg, IV) group prior to sugammadex administration. Blood samples were taken before and after NMB reversal, for plasma dexamethasone (dexamethasone group) and rocuronium (both groups) determination. The primary endpoint was time from sugammadex administration to NMB reversal. Secondary and tertiary endpoints included the ratios of the dexamethasone and rocuronium concentrations after NMB reversal *versus* before sugammadex administration.
**Results and discussion:** The administration of dexamethasone did not delay NMB reversal by sugammadex (P = 0.760). The ratio between the rocuronium concentrations after NMB reversal *versus* before sugammadex administration was significantly affected by sugammadex dose (Beta = -0.375; P = 0.004), while it was not affected by dexamethasone (Beta = -0.186; P = 0.131). There was a significant drop in plasma dexamethasone after sugammadex administration and NMB reversal (P <0.001); however, there was no significant effect of sugammadex dose (P = 0.729) or time between blood samples (P = 0.524). The rise in plasma rocuronium and drop in plasma dexamethasone after sugammadex administration appears not to be a direct consequence of the displacement interaction between dexamethasone and

sugammadex. This discrepancy between *in-vitro* and *in-vivo* models might be due to the lower dexamethasone concentration achieved in human, as well as to the intrinsic factors that influence the pharmacology of both drugs in human, such that clinically, the consequences of their interactions become negligible.
**Conclusion(s):** Dexamethasone does not diminish the reversal of NMB by sugammadex in anesthetized patient.

## 01AP02-6

### The availability and free use of sugammadex affects the choice of the neuromuscular blocking agent (NMBA) and the cost of neuromuscular blockade in general anaesthesia

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**Background and Goal of Study:** Aim of the present study was to investigate the degree in which the free use and availability of sugammadex affects the choice of the NMBA used, the total consumption of rocuronium, as well as the cost of the induction and the reversal of neuromuscular blockade in a large general hospital.
**Materials and methods:** Following the Ethics Committee's approval, we recorded the kind and the total dosage of NMBAs used, in all but cardiothoracic, elective procedures, over a week's time, during which sugammadex was available without any limitations in its use (Group 1). This was followed by a week's period, during which sugammadex was withdrawn from clinical practice, due to artificial shortage in the drug's stock (Group 2), and the same parameters were recorded.
Finally, we compared the total cost of induction and reversal of neuromuscular blockade, between the two groups. All medical and nursing staff but the authors, were blinded to the study.
**Results and discussion:** 97 out of 111 patients of Group 1 received rocuronium whereas only 14 received cis-atracurium. The reversal of neuromuscular blockade in the patients that received rocuronium took place with sugammadex in 96 patients and, only 1 patient received neostigmine. The total amount of rocuronium used in this group was 7140mg whereas that of cis-atracurim 256mg. Regarding the reversal agent in this group, suggamadex was used in a total amount of 21500mg and neostigmine in a total quantity of 37,5 mg. In 45 out of 110 patients of Group 2 rocuronium was administered and the rest 65 of them received cis- atracurium. In this Group for the reversal of neuromuscular blockade suggamadex was administered in only 12 patients, a number significantly statistically smaller( $p<0.005$) respectively to Group 1. The rest 98 patients received neostigmine. The total amount of rocuronium used during this week was 3080 mg and that of cis-atracurium was 1204 mg, whereas 2450 mg of suggamadex and 247,5 mg of neostigmine where used. Based on the prices of these pharmacological agents in Greece the total cost of induction and reversal of neuromuscular blockade in Group 1 was 6.832,71 eu whereas in Group 2 was 941,83 eu.
**Conclusion(s):** The availability and free use of sugammadex for the reversal of neuromuscular blockade affects the choice of MNBA in favor of rocuronium with statistical significance. This practice causes a sevenfold rise in the cost of anesthesia due to neuromuscular blockade and reversal.

## 01AP02-7

### Sugammadex overdose? Randomized trial with 1 or 2 mg/kg of sugammadex to reverse moderate rocuronium-induced neuromuscular blockade

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**Background and Goal of Study:** The use of neuromuscular blocking agents has proved to be beneficial during general anesthesia. However, once the patient has been extubated, residual neuromuscular blockade becomes an undesirable and harmful effect[1]. Sugammadex has proved to be a useful tool against rocuronium-induced residual neuromuscular blockade.
The aim of this study is to demonstrate whether the use of intraoperative monitoring allows dose adjustment not only of rocuronium but also of sugammadex.
**Materials and methods:** We designed a randomized, single-center, double-blind trial. After approval by the ethics committee, 40 patients scheduled for elective laparoscopic cholecystectomy under general anesthesia were included.
Neuromuscular blockade (NMB) was monitored using ulnar nerve stimulation and acceleromyography.
Patients received intravenous propofol, fentanyl and rocuronium (0.6 mg/kg) for induction followed by propofol and fentanyl maintenance anesthesia. Low doses of rocuronium (0.15 mg/Kg) were used to maintain NMB. Patients were randomly allocated to receive sugammadex from a syringe with 20 mg/ml (control group) or 10 mg/ml (study group). After the surgical closure, the anesthesiologist used on-label dosage of sugammadex (2 mg/kg) for the reversal of moderate NMB, assuming they were administrating the 20 mg/ml concentration in all cases. Those patients with profound NMB were excluded. Time to recovery of the train-of-four ratio (T4/T1) to 0.9 was recorded.
Statistical analysis was performed using Student's t-test, Fisher's test and linear regression.
**Results and discussion:** Finally, a total of 34 patients were included (18 in control group and 16 in study group). No statistically significant differences between groups were found neither in demographic data nor in NMB. After sugammadex, T4/T1 recovered to 0.9 was 3,1 ±1,7 minutes in control group and 3,6 ±1,7 minutes in study group ($p>0.05$). No sugammadex adverse effects were observed.
Reversal of moderate NMB by sugammadex can be achieved with lower doses (1 mg/kg) than those recommended on-label by using intraoperative NMB monitoring. These doses do not increase the time needed to reverse NMB. The monitoring guided administration of sugammadex could reduce costs and allow a more extended use of the drug.
**Conclusion:** Reversal of moderate NMB by sugammadex can be achieved with lower doses than those recommended by using intraoperative NMB monitoring.
**Reference:**
Murphy G. Min Anest 2006; 72: 97-109

## 01AP02-8

### Prolonged recovery time of PTC1 to TOF ratio100% from rocuronium-induced muscle relaxation in patients with severe chronic kidney disease after receiving sugammadex in sevoflurane anaesthesia

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**Background and Goal of Study:** It is well known that renal dysfunction, estimated by plasma creatinine concentrations, increased the risk of residual neuromuscular block (RNMB) induced by rocuronium and that there are possibly no relationships between the dose of Sugammadex (SGDX) and recovery from neuromuscular block under renal dysfunctions under various degrees. However, there are no reports, based on the renal function estimated by Glomerular Filtrating Ratio (eGFR), on the relationship between RNMB and renal dysfunction under Sevoflurane (SEV) anaesthesia. In this study, we examined the effect of the SGDX towards the rocuronium in patients under SEV anaesthesia was evaluated by comparing the time required for recovery by determining the time interval between Post tetanic count (PTC)1 and Train of four (TOF) ratio 100% using TOF monitoring.
**Materials and methods:** Twenty-nine adult patients who underwent surgery under general anaesthesia at our hospital were included in this study. We divided the patients into two groups: the R group, who had eGFR of less than 15 and thus severe CKD($n=14$): and the N group, who had eGFR of more than 90 and thus normal renal function ($n=15$). Anaesthesia was induced in both groups with 2 mg/kg propofol and 0.8 mg/kg rocuronium for tracheal intubation and maintained with SEV anaesthesia. PTC1 state was sustained by administration of an appropriate dosage of rocuronium. After confirming the PTC1 value at the end of the surgery, pure oxygen was administered, and 4 mg/kg SGDX was then intravenously injected over 5s. The time interval between PTC1 and TOF ratio100% was measured. We used the TOF- watch (T.X.) SX (Organon Ltd., Ireland). The results are expressed as mean±SD. Date were analyzed with one-way ANOVA. A p value of $<0.05$ was considered statistically significant.
**Results and discussion:** Following SGDX administration, the mean (±SD) time to recovery of PTC1 to TOF ratio 100% was increased to 447±268s in the R group compared with 185±118s in the N group; this difference was statistically significant ($p=0.0016$).

**Conclusion(s):** The muscle relaxation recovery time interval from PTC1 to TOF ratio 100% was prolonged in patients with severe CKD compared to patients with normal kidney function during recovery from rocuronium following SEV anaesthesia when using SGDX. Thus, we recommend that rocuronium should be used with caution in patients with severe CKD during SEV anaesthesia.

## 01AP02-9

### Sugammadex use, lower abdominal surgery, and female sex are factors for early extubation after gastrointestinal surgery

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**Introduction:** This study aimed to assess the characteristics of patients who received neuromuscular blockade (NMB) reversal agents (sugammadex or neostigmine) during recovery from anesthesia after surgery and to identify predictors of early and late extubation.
**Methods:** This was a retrospective study using an automatic anaesthesia recording system to extract 3294 patients who received general anaesthesia and rocuronium for gastrointestinal surgery.
Patients were divided into two groups. The early extubation group (Early group) comprised patients who required less than 15 minutes from completion of surgery until extubation. The late extubation group (Late group) required 15 minutes or more.
Patient characteristics that differed significantly between groups were used as the exploratory variables for the logistic regression model for two variables, and the odds ratio and 95% confidence interval (CI) for each characteristic were calculated. When collinearity was observed between two variables, either of them was deleted. P values of less than 0.05 were considered statistically significant.
**Results:** Of the 3294 patients, 2478 were included in the analysis (259 patients in the Early group and 2219 patients in the Late group).
Independent significant predictors for early extubation were obtained by correcting for patient characteristics that differed significantly between groups. Multivariable logistic regression analysis indicated that female sex (odds ratio = 0.71 [95% CI: 0.55 to 0.93]; $p<0.05$), lower abdominal surgery (odds ratio = 0.63 [95% CI: 0.48 to 0.84]; $p<0.01$), and use of sugammadex (odds ratio = 0.74 [95% CI: 0.56 to 0.98]; $p<0.05$) were independent predictors for early extubation.
**Discussion:** Independent predictors of early extubation included female sex and lower abdominal surgery, neither of which can be controlled. The findings of this study suggest that appropriate management of residual muscle relaxation by monitoring muscle relaxation or other measures can promote early extubation.
**Conclusion:** For achievement of early extubation, recovery from muscle relaxation is important and proper use of sugammadex facilitates recovery.

## 01AP02-10

### Severe bradycardia and asystolia associated with sugammadex

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**Background:** Sugammadex is a selective relaxant binding agent, recently introduced to reverse neuromuscular blockade induced by rocuronium and vecuronium. Its efficacy and safety are well demonstrated in multiple clinical trials, being severe cardiac adverse events a rarity (<1%)[1].
We present a case of severe bradycardia followed by asystolia immediately after intravenous sugammadex administration.
**Case report:** A 54-year-old male patient admitted in the emergency department with an incarcerated umbilical hernia was scheduled for urgent herniorraphy. He had a past history of hypertension, dyslipidemia and obesity and no other cardiac diseases or allergies. Preoperative electrocardiography and blood biochemistry were normal.
Rapid sequence induction was achieved with fentanyl, propofol and succinylcholine. Anaesthesia was maintained with desflurane, neuromuscular blockade was achieved with rocuronium and surgery proceeded uneventfully. At the end of the procedure we monitored neuromuscular blockade and 200mg intravenous sugammadex were administered. Approximately 30 seconds following the administration, patient developed marked bradycardia (30 beats/min) followed by asystolia. Chest compressions were initiated and 1mg intravenous atropine was immediately administrated. In about one minute the patient was in sinus rhythm (63 beats/min), without the need of any other therapeutic intervention. When spontaneous ventilation was achieved patient was extubated and moved to the postoperative care unit. Patient remained stable during hospital stay and was discharged 48h later.
**Discussion:** In rare instances marked bradycardia, and occasionally cardiac arrest, may be observed within minutes after the administration of sugammadex[1]. As far as we know, there's just one case reporting severe bradycardia induced by sugammadex[2]. It is known that disturbance in cardiac conductance can occur but no cases of arrhythmia have been reported. Cases of cardiovascular collapse have been described in the context of hypersensitivity reactions and never as a cardiac side effect[3].
**References:**
http://www.ema.europa.eu
Bilgi M, Abdullah D, Akkaya A et al. Int J Med Sci Public Health 2014;3(3):372-374
Tsur A and Kalansky A. Anaesthesia 2014;69:1251-1257
**Learning points:** Our case is a reminder that cardiac arrest is a rare but possible side effect of sugammadex and that awareness must be raised for a successful outcome.

## 01AP02-11

### Sugammadex reversal of inadvertent subcutaneous injection of rocuronium - a case report

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**Background:** Drug-related errors are estimated to occur in one out of five doses given to patients in hospitals[1], and are one of the most common anaesthetic blunders. Supportive care is the mainstay of treatment, however, specific reversal of the offending agent should be added whenever feasible. Errors comprising wrong routes of administration add to the pharmacokinetic complexity of treatment and raise safety concerns. We present a case of inadvertent rocuronium injection; the first we have knowledge of in which it was given subcutaneously.
**Case report:** A 78 year-old female patient was scheduled for reconstructive facial plastic surgery under sedation. There was no history of allergies. Sedation was started with an IV loading dose of dexmedetomidine, lidocaine and magnesium sulphate, and multiple facial nerve blocks were performed with a total dose of 10 ml of 2% lidocaine, prepared just prior to surgery by the attending anaesthetist.
Within 10 minutes of block onset the patient became tachycardic, hypertensive and showed signs of respiratory discomfort and desaturation in room air, and mislabelling of the local anaesthetic syringe was presumed after an empty vial of rocuronium was found onto the medication cart. She was treated with 400 mg of IV sugammadex. A T4/T1 relation of > 90% in a train of four test was obtained within ten minutes, and symptoms abated. There were no further signs of muscular fatigue or dyspnea during four hours of observation in PACU.
**Discussion:** Rocuronium reversal by sugammadex is well established, however, its two hours half-life[2] might become a concern should recirculation occur, as is plausible after an unduly subcutaneous injection. In our case, blockade installation was slow, and was successfully managed with a single dose of sugammadex. More studies are still needed to establish the optimal dosing regimen in other resemblant cases.
**References:**
1. Barker KN et al. Arch Intern Med 2002; 162:1897-1903.
2. Bridion (sugammadex) prescribing information. MSD, UK, 2015.
**Learning points:** Inadvertent drug injection is one of the most common causes of anaesthetic misadventures, and incurs in significant morbidity. Anaesthetists ought to keep a high index of suspicion when faced with incompatible or unexpected drug reactions, as failure to link those to equivocal drug administration might be potentially fatal. In a sole case, a single dose of sugammadex proved to be effective for complete reversal of subcutaneously injected rocuronium.

## 01AP03-1

### Reverse Takotsubo cardiomyopathy in the setting of acute abdomen

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**Background:** Reverse Takotsubo is a variant of the classic cardiomyopathy of transient left ventricular apical ballooning but typically presents at a younger age and is always associated with an emotional or physical stress as a trigger.
**Case report:** We report a case of a 32-year-old woman,with insignificant past medical history, presenting at the emergency department with acute pain at the abdomen and emesis. Preoperative evaluation included 12 lead electrocardiogram which revealed ST-depressions and T-wave inversions in precordial leads.Troponin T Hs, Cardiac Brain Natriuretic peptide and Creatinine Kinase-MB were elevated. The patient complained of severe pain at the abdomen with no dyspnea, chest pain or signs of heart failure.
Transthoracic echocardiogram revealed severe hypokinesis of the basal and mid segments of the heart and preserved contractility of the apex with an estimated ejection fraction of 35%. There was also small pericardial effusion. The patient had had a transthoracic echocardiogram during her pregnancy, two months ago, which was normal. Anaesthesia was uneventful using invasive monitoring of the arterial blood pressure, cardiac output and stroke volume variation monitoring to guide our fluids intraoperatively. Postoperatively the patient went to the coronary care unit. She had full cardiological recovery after fifteen days.
**Discussion:** Emergency laparotomies are associated with high rates of postoperative complications and death with a one month mortality rate of 15%. In an emergency situation it is easy to underestimate routine clinical findings such as changes in the ECG, especially when the patient is in pain, young, previously well and fit. Even P-Possum score would underestimate the individualised needs of our patient who needed specialised monitoring and cardiological post operative care. Takotsubo syndrome and its variants are referred more often in the literature and have a strong relation with excess of catecholamines and stress hormones.
**Learning points:** There is a need for anaesthetists to be vigilant regarding Takotsubo syndrome because this warrants for different perioperative management.

## 01AP03-2

### A case report on a patient with Wolff-Parkinson-White syndrome presenting for scoliosis surgery

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**Background:** Wolff-Parkinson-White syndrome (WPW) is a congenital syndrome with an increased risk of malignant tachyarrythmias and sudden cardiac death[1]. Inappropriate treatment of this syndrome can quickly cause clinical deterioration[2]. Unfamiliarity with this rare condition (0.1-0.3% of population)[3] and difficult resuscitation in the prone position could further worsen outcomes.
**Case report:** We report a 16 year-old girl with WPW and Down syndrome who underwent scoliosis surgery. She was subjectively asymptomatic after the first episode of tachyarrhythmia, had no electrophysiologic study done, and was not on antiarrhythmics. Her parents were counselled on the risk of tachyarrhythmias requiring electrical cardioversion and cardiopulmonary resuscitation. Adenosine and procainamide were made readily available preoperatively. We instituted invasive haemodynamic monitoring post-induction and defibrillation pads were applied prior to prone positioning. Excessive increases in sympathetic or vagal tone were prevented. Surgery proceeded uneventfully, with an uneventful recovery in the paediatric intensive care unit.
**Discussion:** There have been case reports describing the peri-operative management of WPW, and ACC-AHA 2015 guidelines on the management of tachyarrhythmias in these patients. However, we were unable to find a succinct guide to intraoperative arrhythmias in WPW. These resources also do not address the unique circumstance of our patient needing prolonged major surgery in the prone position. Unfamiliarity with WPW impacted the anaesthetic plan, a concern mirrored in a survey we conducted in our institution. We thus crystallized information in the literature to formulate an easy reference guide, and find that it would be useful to share our experience.

**References:**
1. Pappone C, Vicedomini G, Manguso F, et al. Wolff-Parkinson-White syndrome in the era of catheter ablation: insights from a registry study of 2169 patients.Circulation 2014;130:811-9.
2. Bengali, Raheel et al. Perioperative Management of the Wolff-Parkinson-White Syndrome. Journal of Cardiothoracic and Vascular Anesthesia, Volume 28,Issue 5,1375-1386
3. Chung KY, Walsh TJ, Massie E. Wolff-Parkinson-White syndrome. *Am Heart J.* 1965;69:1-8.
**Learning points:** WPW poses a significant risk of adverse cardiac outcome. In patients undergoing major surgery with limited physical access for resuscitation, conscientious preparation and a clear, succinct treatment algorithm could make the difference.

## 01AP03-3

### takotsubo cardiomyopathy and hip fracture - delay the case or proceed to surgery?

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**Background:** Takotsubo cardiomyopathy (TC) is a form of reversible cardiomyopathy. Outcomes of the disease are unknown in patients who need surgery. We report a case of a woman with a hip fracture and TC who underwent surgery shortly after the onset of the illness.
**Case report:** A 75-year-old woman was admitted to our hospital with fracture of the left hip. On admission she complained of pain at the fracture site and chest pain. She was hemodynamically stable. ECG showed normal sinus rhythm with ST-segment elevation in leads V2-V4. Troponin I was elevated. Coronary angiography was normal. Left ventriculography demonstrated apical ballooning. TC was diagnosed. The decision was to operate on the patient's fractured femur. Surgery was uneventful and performed under general endotracheal anesthesia (GEA). Two months postoperatively echocardiography was normal.
**Discussion:** Clinical presentation of TC may mimic myocardial infarction, even in the absence of obstructive coronary artery disease. There is limited data about the outcome of patients operated during the onset of this illness. In all cases hip surgery was performed within an average period of six days after almost complete normalization of left ventricular function (1). There are real benefits of early surgery in patients with hip fractures. The fact that our patient was hemodynamically stable influenced our decision to proceed with surgery under GEA (2). The patient tolerated the procedure exceptionally well and enjoyed the benefits of timely performed hip fracture surgery.
**Conclusion:** A hemodynamically stable patient with hip fracture and TC may have surgery under general anesthesia before left ventricular function becomes normalized.
**References:**
1. Rostagno C, Cammilli A, Di Cristo A, Polidori G, Cartei A, Ranalli C, Buzzi R. Takotsubo cardiomyopathy in four elderly females after hip fracture. Research 2015;2:1321-1325.
2. Luger T, Kammerlander C, Gosch M, et al. Neuroaxial versus general anaesthesia in geriatric patients for hip fracture surgery: does it matter? Osteoporos Int 2010; 21(suppl 4): S555e72
**Learning points:**
1. The preoperative period of patients with femoral fractures might be complicated by the development of the TC.
2. The final decision to proceed with the surgery or delay the case is based on hemodynamic status and evidence of congestive heart failure.
3. If the surgery must be done during onset of the stress cardiomyopathy general anesthesia is probably the preferred method.

## 01AP03-4

### Takotsubo cardiomyopathy associated with anesthesia - a case report

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**Background:** Takotsubo Cardiomyopathy (TC) was first reported in 1990 by Sato et al and Doron Gavish et al were the first publishing an anesthesia associated takotsubo case. It was named after an octopus fishing pot (Takotsubo) because of it's appearance on the left ventriculography.TC is rare, mimics an acute coronary syndrome and results in a reversible acute left ventricular dysfunction in the absence of obstructive coronary disease. It is more common in postmenopausal women, although it can also affect young men. The prognosis is favorable, showing low complication rates and intra-hospitalar mortality and a recurrence of 10%. Nevertheless, serious complications as cardiac arrest can occur.
**Case report:** We are reporting a case of a 66 years old male without relevant past medical history, that presented for an elective inguinal herniorrhaphy. Preoperative evaluation with no significant findings, besides a high level of anxiety. On the anesthesia emergence he showed hemodynamic instability, followed by cardiac arrest. The ECG performed was compatible with an acute myocardial infarction. He presented with associated raised cardiac enzymes, normal coronary angiography and abnormal ventriculography showing severe depression of systolic function and typical motility changes of TC.
**Discussion:** The described case, reporting a left ventricular dysfunction with an ECG suggesting acute coronary syndrome associated with a cardiogenic shock, is compatible with the diagnose of TC. Despite of the fact that the patient doesn't fit in the common profile of this syndrome (female, post-menopause), this case gathers all the diagnostics criteria and typical evolution of the TC: emotional and physical stress, cardiac markers and ECG suggestive of ACS, normal coronary angiography, image feature on ventriculography, severe early ventricular dysfunction with rapid recovery, good evolution and no recurrence.
**Learning points:** The number of reports of MT is relatively small and its pathophysiology, treatment and prognosis aren't well understood. There is a direct correlation between physiologic stress and cardiovascular events from the anesthetic induction until the 4th post-operative day. This case describes the occurrence of a TC during general anesthesia, namely during anesthetic emergency, and highlights the importance of a crucial early diagnosis.

## 01AP03-5

### The effectiveness of prophylactic doses of intravenous nitroglycerin in preventing the incidence of myocardial ischaemia under general anaesthesia; a systematic review and meta-analysis

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**Background:** Nitroglycerin (TNG) has been shown to reverse myocardial ischemia (MI). Observational studies have suggested that prophylactic doses of intravenous TNG is effective in reducing the incidence of intraoperative MI. However, the results of previous randomised controlled trials are not as convincing. As a result, the effectiveness of prophylactic TNG in the prevention of intraoperative MI remains controversial. The purpose of this study was to evaluate whether prophylactic intravenous TNG can prevent the incidence of intraoperative MI. In addition, we also analyzed haemodynamic changes (heart rate [HR], mean blood pressure [MBP], and pulmonary capillary wedge pressure [PCWP)] from TNG in both pre and post anaesthesia induction as an indicator of the decrease in preload.
**Methods:** This quantitative systematic review was performed according to the criteria outlined in the PRISMA statement. A comprehensive literature search was conducted to identify clinical trials which involved the administration of TNG in comparison to a placebo. The data from the individual trials were combined and the DerSimonian and Laird random-effects model was used to calculate either the pooled Relative Risk (RR) or the demonstrated weighted mean difference (WMD) in addition to the corresponding 95% confidence intervals (CI). The data was analyzsed to clarify differences in the incidence of MI. We also analyzsed haemodynamic changes (HR, MBP, and PWCP) between TNG and the placebo. The heterogeneity of the results was examined by Cochrane's Q and $I^2$ test.
**Results:** Using electronic databases, we selected 8 trials for our review. Prophylactic intravenous TNG did not result in a decreased incidence of MI (RR= 0.61; 95% CI, 0.33 to 1.13; p=0..12; I2=55, Cochran's Q = 13.3). In terms of haemodynamic changes pre and post anaesthesia induction, intravenous TNG significantly reduced the MBP in comparison to the placebo. MBP; pre induction; WMD = -7.27; 95% CI -14.2 to -0.33; P = 0.04; $I^2$ = 97%; Cochrane's Q = 136.9, post induction; WMD = -0.60; 95% CI -10.3 to -2.09; P = 0.003; $I^2$ = 68%; Cochrane's Q = 9.48)
**Conclusions:** Our analysis showed that prophylactic intravenous TNG does not reduce the incidence of intraoperative MI. Prophylactic doses of intravenous TNG significantly reduced the MBP both pre and post anaesthesia induction. From these results, prophylactic intravenous TNG provided little clinical benefit as it was not effective preventing the incidence of intraoperative MI.

## 01AP03-7

### Novel etomidate analogues: optimized anesthetics that does not arouse prolonged adrenocortical suppression

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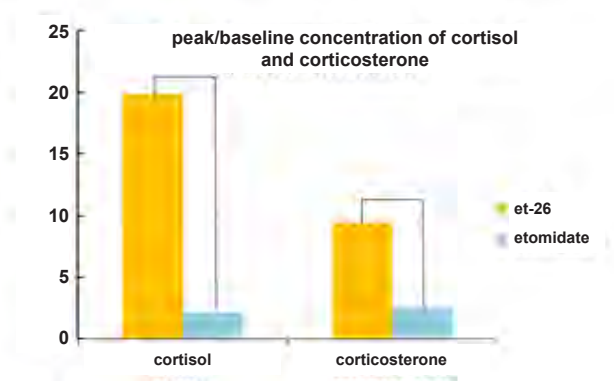
**Background and Goal of Study:** The clinical application of etomidate is limited by its adrenocortical suppression although it is a rapid onset sedative-hypnotic drug with stable hemodynamic. In order to alleviate this adverse effect of etomidate, two kinds of etomidate analogues were developed. Our study was to preliminarily screen out drugs with higher potency and appropriate anesthetic effect to compare their adrenocortical function with etomidate.
**Methods and materials:** Efficiency was estimated at equivalent doses ($2ED_{50}$) in dogs. Cortisol and corticosterone, as the symbol of adrenocortical function hormone, were analyzed in dogs by ELISA. We selected the optimal compound with high efficiency and proper anesthetic effectt to compare adrenocortical function with etomidate. Mean arterial pressure of dogs treated with this novel compound and etomidate was recorded.
**Results and discussion:** All the compounds represented hypnotic-sedative function in dogs.

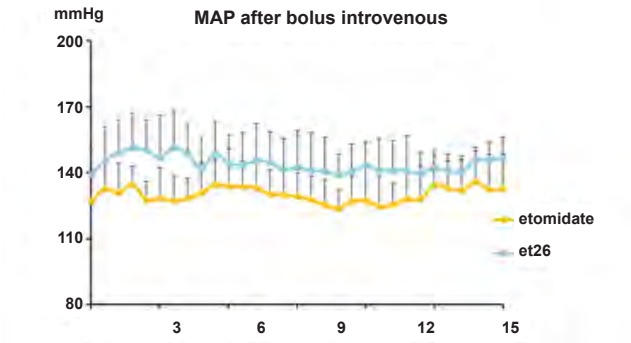
| Drug | Etomidate | ET-25 | ET-28 | ET-YZ | ET-26 | ET-42 |
|---|---|---|---|---|---|---|
| ED50 | 0.43 | 0.96 | 22.69 | 41.54 | 1.44 | 0.72 |
| Duration time | 5.36 ±1.74 | 3.65 ±0.83 | 3.36 ±0.29 | 12.47 ±5.93 | 3.21 ±0.82 | 7.94 ±0.38 |
| P vs. eto | - | =0.263 | =0.194 | <0.001 | =0.163 | =0.096 |
| Recovery time | 1.78 ±0.85 | 5.19 ±0.95 | 4.26 ±0.24 | 2.38 ±1.21 | 1.84 ±0.74 | 9.67 ±0.45 |
| P vs. eto | - | <0.001 | <0.001 | =0.230 | =0.852 | <0.001 |

*[Table 1. ]*




*[Figure 1. Peak/baseline concentration of cortisol and corticosterone]*

The artery blood pressure of Beagle dogs was stable after administration with ET-26 in 15 minutes




*[Figure 2. Mean arterial pressure of dogs after intravenous administration with etomidate and ET-26]*

**Conclusions:** ET-26 was proved to have excellent anesthetic effect, stable hemodynamic and slighter adrenocortical suppression.

## 01AP03-9

### Bolus administration of ephedrine and etilefrine induces transient vasodilation just after injection in man

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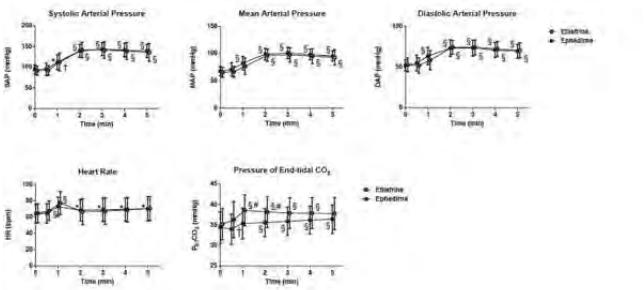
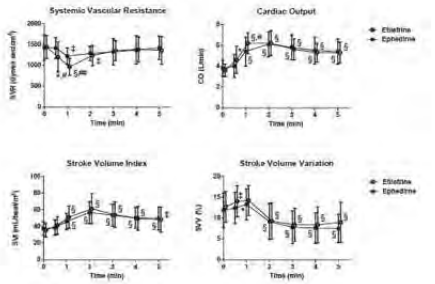
**Background and Goal of Study:** Hypotension commonly accompanies anaesthesia, and intravenous ephedrine and etilefrine are widely used to correct hypotension during anaesthesia. We have noticed that these drugs decrease systemic vascular resistance (SVR) transiently just after bolus intravenous administration. The goal of the present study was to investigate whether bolus administration of these drugs decrease SVR just after intravenous administration, and also to evaluate potential differences in very acute haemodynamics between intravenous ephedrine and etilefrine in man, which has never been reported.
**Materials and methods:** Patients were randomised to receive either ephedrine or etilefrine intravenously. After epidural anaesthesia was performed, and 30 minutes after induction of general anaesthesia, if a decrease in systolic blood pressure (SAP) of >20% compared with that just before epidural anaesthesia or a SAP of <100 mmHg occurred, the patient was chosen as a subject, and baseline haemodynamic values were recorded. These values were recorded again for 5 minutes after bolus injection of ephedrine 10 mg or etilefrine 2 mg (doses are considered equipotent).
**Results:** 40 patients were examined. Patient characteristics were comparable in both groups. After ephedrine bolus injection, systemic vascular resistance (SVR) decreased significantly at the 1-min time point compared with baseline values. After etilefrine bolus injection, SVR decreased significantly at the 0.5- to 2-min time points compared with baseline values. There were significant decreases in SVV at the 2- to 5-min time points and in SVR at the 0.5- to 2-min time points compared with baseline values. SVR at the 0.5- to 1-min time points was lower in the etilefrine versus the ephedrine group.
**Conclusions:** Both drugs decreased SVR transiently after intravenous injection, but etilefrine decreased SVR much more than ephedrine, indicating that more vasodilation occurs after the injection of etilefrine than after ephedrine. Thus, it is important to recognise the characteristics of these drugs.




*[Figure 1. Sequential changes in systolic arterial pressure (SAP), mean arterial pressure (MAP), diastolic arterial pressure (DAP), heart rate (HR) and pressure of end-tidal $CO_2$ ($P_{ET}CO_2$) during the study. Data are expressed as mean ± standard deviation. *P<0.05 vs baseline; †P<0.01 vs baseline; ‡P<0.005 vs baseline; §P<0.001 vs baseline; #P<0.05 compared with ephedrine group]*




*[Figure 2. Sequential changes in systemic vascular resistance (SVR), cardiac output (CO), stroke volume index (SVI) and stroke volume variation (SVV) during the study. Data are expressed as mean ± standard deviation. *P<0.05 vs baseline; †P<0.01 vs baseline; ‡P<0.005 vs baseline; §P<0.001 vs baseline; #P<0.05 compared with ephedrine group, ##P<0.001 compared with ephedrine group]*

## 01AP03-10

### Acute mesenteric ischemia in a patient with severe cardiac disease

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**Background:** Acute coronary syndrome, coupled with severe mitral disease with a few hours of onset, is an anesthetic challenge. Perioperative handling, therapeutic choice and adequate monitoring are fundamental to maintain hemodynamic stability. The following case report describes a successful anesthetic approach in a patient with poor prognosis.
**Case report:** A 65 years old female, ASA VE, was admitted to the emergency OR for exploratory laparotomy for suspicion of mesenteric ischemia. Past history: type II Diabetes Mellitus, Hypertension and Obesity. Admitted to the Cardiology ICU in the past 48h for acute myocardial infarction. Transthoracic Ecocardiography: severely compromised left ventricular function (EF=22%) and severe mitral insufficiency with tendinous cord rupture. An intra-aortic ballon pump (IABP) was placed to maintain hemodynamic stability and she was scheduled for coronary bypass surgery and mitral valve replacement the next day. She had 2 episodes of atrial fibrillation with fast ventricular response that continued despite treatment. The IABP was removed 1 hour before surgery and heparin was suspended. After standard monitoring and placement of an arterial line, heart rate control was done with 3 boluses of labetalol 1mg. For the anesthetic induction we used midazolam 1mg, etomidate 0.2mg/kg, fentanyl 0.15 mg and rocuronium 1mg/kg. A central venous catheter was placed and 2 infusions were started: noradrenaline at 0.1 ug/kg/min to maintain adequate blood pressure and isosorbide dinitrate because of the coronary disease. Maintenance was done with sevoflurane, fentanyl and morphine. The patient stayed hemodinamically stable with no surgical or anesthetic events. Diagnosis was confirmed and a bowel resection and colostomy were made. She was transferred to the ICU under assisted ventilation and sedated with midazolam and morphine.
**Discussion:** The serious cardiac and surgical disease of this patient predicted a poor prognosis. Difficulties maintaining hemodynamic stability were

expected after anesthetic induction and during the surgery. The choice of the anesthetic approach and drugs is not an easy one and this case report shows a successful handling of a critical situation.
**Reference:**
Anesth Essays Res. 2013 Sep-Dec; 7(3): 399-401.
**Learning points:** Patients with severe cardiac conditions submitted to urgent procedures require a careful anesthetic management aiming for hemodynamic stability and outcome improvement.

## 01AP03-11

### Creatinine reduction ratio is a good prognostic factor of perioperative acute kidney injury and long-term renal function after cardiac surgery with cardiopulmonary bypass. A single centre retrospective cohort study

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**Background and goal of Study:** The incidence of acute kidney injury (AKI) following cardiac surgery is 5-30%. Our previous study suggested that the intraoperative creatinine reduction ratio (CRR) calculated as {(postoperative serum creatinine (sCr) - preoperative sCr)/preoperative sCr} x 100 (%) might be useful in detecting AKI earlier than conventional means (1). However, this study did not include perioperative information and long-term outcome of renal function.
The aims of this study were:
(1) to evaluate the prognostic performance of CRR as the predictor of AKI and (2) to elucidate whether perioperative AKI leads to chronic renal disease (CKD).
**Materials and methods:** We retrospectively collected data of patients who underwent cardiac surgery with cardiopulmonary bypass (CPB) at Yokohama City University Hospital from 2009 to 2014. AKI was defined by the AKIN and RIFLE criteria where the serum Cr (sCr) increased by (1) ≧0.3mg/dl or (2) ≧150% from baseline within 48-hour afNTter surgery. Patients were classified to either AKI or non-AKI group, and then we performed univariate and multivariate analyses to determine risk factors of AKI.
In addition, by using the ROC curve, we investigated the predictive power of CRR <20% that is determined as the threshold of CRR in the previous study.
**Results and discussion:** 225 consecutive patients were enrolled to this study. 97 (43%) patients developed perioperative AKI. In the univariate analysis, preoperative sCr, surgery time, platelet transfusion, CPB time, and CRR were significantly different between the two groups. In the multivariate logistic analysis, CRR was determined as an independent predictor of AKI with an adjusted odds ratio 1.44 (1.24-1.68). Furthermore, CRR <20% has good prognostic power for AKI as AUC 0.71 (0.65- 0.78), sensitivity 93.6%, specificity 27.4%. In the healthy kidney patients, the incidence of CKD after 3-6 months of operation was significantly different between those who developed AKI and those who did not (23.9%, 17/71 vs. 6.7%, 6/89, respectively. P<0.01).
**Conclusion:** The CRR calculated from intraoperative variation of sCr was an independent predictor of AKI. Therefore, intraoperative CRR may enable clinicians to detect AKI and start treatment early, which is crucial for successful treatment of AKI. Furthermore, our results have demonstrated that perioperative AKI may lead to CKD in the distant postoperative period.
**Reference:**
1. Takaki S. Interact Cardiovasc Thorac Surg. 2015.

## 01AP03-12

### Influence of caudal traction of ipsilateral arm on ultrasound image for supraclavicular central venous catheterization

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**Background and Goal of Study:** The first step for successful ultrasound (US)-guided subclavian vein (SCV) catheterization using a supraclavicular approach is to obtain a good longitudinal image of SCV for in-plane needle placement. We evaluated the efficacy of caudal traction of ipsilateral arm on the exposure of the SCV.
**Materials and methods:** We enrolled 20 infants, 20 children, and 20 adults undergoing general anesthesia. After tracheal intubation, US probe was applied as the supraclavicular approach and the longitudinal US image of SCV was obtained in three different ipsilateral arm positions; neutral, caudal traction, and abduction. The length of puncturable SCV, the diameter of SCV, and the available angle for needle insertion in three different arm positions were analyzed.
**Results and discussion:** In all patients, the length of puncturable SCV and the available angle for needle insertion were significantly increased after caudal traction (35.6 ± 27.1 % and 25.0 ± 19.3 %, respectively) and decreased following the abduction (36.6 ± 22.9 % and 29.5 ± 23.8 %, respectively) compared to neutral position. The diameter of SCV was not changed after applying the caudal traction in infants and children. But in adults, the caudal traction slightly increased the diameter of SCV
(P = 0.012).
**Conclusion(s):** The caudal traction of ipsilateral arm towards to the knee improves the longitudinal US view of SCV for the supraclavicular approach, without reducing its size. Proper caudal traction of the arm might ensure the high success rate with safe needle insertion technique. Abduction should be avoided during US-guided supraclavicular SCV catheterization.
**References:**
1. Verghese ST, McGill WA, Patel RI, Sell JE, Midgley FM, Ruttimann UE. Ultrasound-guided internal jugular venous cannulation in infants: a prospective comparison with the traditional palpation method. Anesthesiology 1999;91:71-7.
2. Pirotte T, Veyckemans F. Ultrasound-guided subclavian vein cannulation in infants and children: a novel approach. Br J Anaesth 2007;98:509-14.
3. Byon HJ, Lee GW, Lee JH, Park YH, Kim HS, Kim CS, et al. Comparison between ultrasound-guided supraclavicular and infraclavicular approaches for subclavian venous catheterization in children--a randomized trial. Br J Anaesth 2013;111:788-92.

## 01AP04-1

### Evaluation of a capnodynamic method for monitoring effective pulmonary blood flow in an ischemia and reperfusion porcine model

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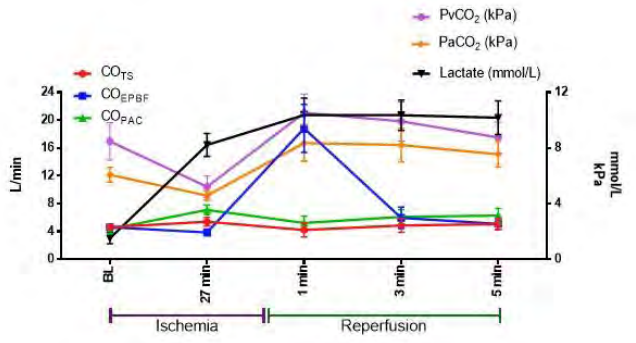
**Background and Goal of Study:** A capnodynamic equation can be used to calculate effective pulmonary blood flow ($CO_{EPBF}$) i.e. cardiac output (CO) minus shunt.(1) An ischemic injury with subsequent reperfusion increases the concentrations of carbon dioxide temporarily, a situation that theoretically could affect the agreement of a capnodynamic method.
The aim of the current study was to evaluate $CO_{EPBF}$ during rapid changes in $PvCO_2$ in an ischemia and reperfusion porcine model.
**Materials and methods:** The required alterations of alveolar concentration of carbon dioxide are created by a ventilatory pattern containing cyclic reoccurring expiratory holds. The mathematical model used to calculate $CO_{EPBF}$ assumes a steady state in $PvCO_2$ levels.
$CO_{EPBF}$ was compared to a reference method for CO, an ultrasonic flow probe around the pulmonary trunk and a pulmonary artery catheter in a porcine model (N=8).
A 10 Fr Reliant catheter (Medtronic) was placed in the aorta below the diaphragm via the femoral artery and inflated until blood flow in the contralateral femoral artery was abolished according to ultrasound doppler. Hemodynamic measurements, lactate levels and $PvCO_2$ were obtained at baseline before balloon inflation, at minute 27 of ischemia and after deflation at minute one, three and five during reperfusion.
**Results and discussion:** The ischemic model resulted in significant changes in lactate and $PvCO_2$ levels from baseline 1.5 mmol/L (1.2-2.4) and 8,5 kPa (7.2-11.4) at baseline to 8.2 mmol/L (7.2-9.0) and 5.2 kPa (4.1-6.2) at minute 27 of ischemia and 10.4 mmol/L (7.8-11.4) and 10.7 kPa (9.0-12.3) at minute one after deflation. At baseline a Bland Altman plot showed bias 0.6 L/min, limits of agreement (LoA) -0.5 - 1.7 L/min and a percentage error (PE) 26%. At minute five bias was 0.02 L/min, LoA -1.8 - 1.9 L/min and PE 37%.
**Conclusion(s):** $CO_{EPBF}$ recuperates fast after rapid changes in $PvCO_2$ resuming acceptable levels of agreement in 5 minutes.




*[Timeline during Ischemia/Reperfusion injury]*

**Reference:**
Hallsjo Sander C et al. Novel continuous capnodynamic method for cardiac output assessment during mechanical ventilation. Br J Anaesth. 2014;112(5):824-31.
**Acknowledgements:** Hedenstierna Laboratory, Uppsala, Sweden

## 01AP04-2

### Recruitment maneuvers: supine position compared with prone position in major spine surgery

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**Background and Goal of Study:** Lung-protective ventilation (low tidal volumes, positive end-expiratory pressure and lung recruitment maneuvers (LRM)) has been experienced in lung and abdominal major surgery. Thus, LRM should be use at any major surgery, especially in major spine surgery, which requiring prone position (PP). The impact of LRM performed in PP during spine surgery is currently unknown and may be different from the supine position (SP).
The aim of this study was to compare hemodynamic consequences of LRM in PP to those in SP during major spine surgery.
**Materials and methods:** This was an observational prospective study approved by local ethics committee. Inclusion criteria were > 18 years of age, operated of major spine surgery. Exclusion criteria were usual contraindications of LRM. LRM was defined as sustained inflation with a pressure of 30 cmH2O during 30 seconds. Parameters were recorded at 3 time points: after anesthesia induction in SP (T1), before incision in PP (T2) and at the end of surgery, in SP (T3). Hemodynamics parameters (heart rate, systolic, diastolic, mean arterial pressure, pulse pressure) obtained with standard monitoring were compared with those obtained by Nexfin monitor (Edwards Lifesciences). Bayesian statistics were used to analyze the data.
**Results and discussion:** Fifteen patients were included from November 2014 to June 2015: 10 women (67%), median age was 54 (19-76) years. Pulse pressure decreased during LRM (bayesian probability (pr) = 100%). The decrease in pulse pressure was significantly more pronounced in PP (T2: 18 ±2mm Hg) compared to SP (T1 and T3, respectively: 13 ±2mmHg and 13 ±2mmHg; pr ≥93%).
We hypothesized that this could reflect a more pronounced stroke volume decrease in PP. Other hemodynamic parameters were similarly decreased in PP and SP during LRM. Correlation coefficients between standard and Nexfin monitors for systolic, diastolic and mean pressure were: 0.92 (0.87-0.98), 0.87 (0.80-0.94) and 0.90 (0.85-0.96).
**Conclusion(s):** During major spine surgery and compared to SP, LRM performed in PP showed a more pronounced decrease in arterial pulse pressure and probably in stroke volume.

## 01AP04-3

### The effects of different pressure pneumoperitoneum on the pulmonary mechanics and surgical satisfaction in the laparoscopic cholecystectomy

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**Background and Goal of Study:** Inspiratory, hemodynamic and metabolic changes occur in laparoscopic surgery depending on pneumoperitoneum and patient positions(1).
This study aims to evaluate the effects of intraabdominal pressure increase based $CO_2$ pneumoperitoneum in laparoscopic operations on the hemodynamic parameters and respiratory dynamics in the satisfaction of surgeon and operative view.
**Materials and methods:** After IRB approval and after written informed consent 116 consecutive, prospective, ASA class I-III, aged 18-70 years undergoing laparoscopic cholecystectomy were enrolled in this study. Totally 104 patients' data were analysed, the patients were divided into two groups as the group Low Pressure (<12mmHg) (LP) (n=53) and the group Standart Pressure (>13mmHg) (SP) (n=51).
The methods of anesthesia which applied in both groups were recorded. Before, during and after the peritoneal insufflation the peroperative ventilation parameters and hemodynamics parameters were recorded. The adequacy of the pneumoperitoneum (adequate/inadequate), gastric distention (VAS scale) and the operative view as graded (1-poor to 4-excellent) by the operating surgeon were also recorded.

**Results and discussion:** In this study it observed that administration of general anesthesia with total intravenous anesthesia in both groups . All groups were applied standart and TOF monitorization. The peripheral oxygen saturation indicate not significant difference between the low and standart pressure pneumoperitoneum in view of tidal volume, respiratory rate, end tidal $CO_2$, mean and peak inspiratory pressure, minute ventilation values. In terms of hemodynamic, when compared just after the intubation and before extubation values, it was observed that in LP group systolic, diastolic and mean blood pressure values were higher ($p<0.05$). In terms of heart rate, it was not observed a significant difference in determined periods between groups. It was not found a significant difference between the groups in terms of surgical satisfaction and vision.
**Conclusion:** The low pressure pneumoperitoneum provides effective respiratory mechanics and a stabil hemodynamic in laparoscopic cholecystectomy. Besides, it provides to the surgeon a sufficient place for his hand manipulations. As anaesthetic method, TIVA and neuromuscular blockage provided a good surgery vision in low pressure pneumoperitoneum.
**Reference:**
Gurusamy K et al. *The Cochrane Cochrane Database of Systematic Reviews* 2009:2;1-50.

## 01AP04-4

### Influence of the pressure measuring site for velocity / pressure loops and rationale for a transfer function

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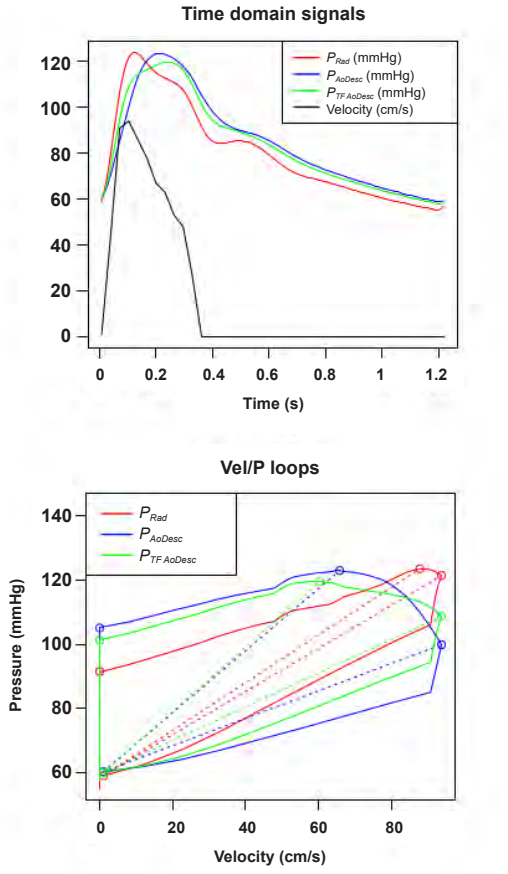
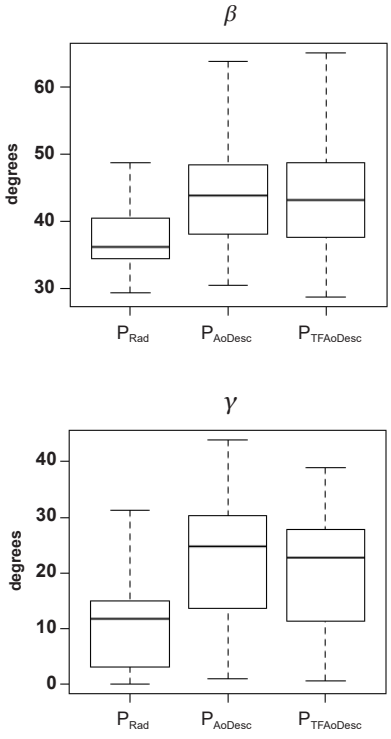
**Background:** Velocity/pressure (Vel/P) loop obtained by combining aortic velocity (measured with oesophageal Doppler-OD-, CombiQ™, Deltex Medical, Chichester, UK) and arterial pressure signals represents a tool to quantify afterload of the heart and arterial stiffness with at least two remarkable angles: β and γ. Pressure is usually measured in radial artery ($P_{Rad}$) rather than in descending thoracic aorta ($P_{AoDesc}$) where OD measures blood flow. Our aims were to assess the influence of the site of pressure recording on the values of β and γ and to develop a mathematical transfer function (TF) to estimate $P_{AoDesc}$ from $P_{Rad}$ and then reconstruct Vel/$P_{TFAoDesc}$ loops.
**Materials and Methods:** After institutional review board approval (CE SRLF n°11-356), 15 patients scheduled for elective endovascular neuroradiology were included. Pressures were recorded simultaneously in the radial artery and in the aorta. Vel/$P_{Rad}$ and Vel/$P_{AoDesc}$ loops were constructed and compared. TF was estimated using an autoregressive-exogenous (ARX) model to obtain a simulated descending thoracic aorta pressure waveform ($P_{TFAoDesc}$). The estimation was quantified by the normalized root-mean-squared error (NRMSE). Vel/$P_{TFAoDesc}$ loops were constructed and compared to Vel/$P_{AoDesc}$ loops.
**Results and Discussion:** 153 loops were analysed. β and γ angles were systematically lower in the Vel/$P_{Rad}$ compared to the Vel/$P_{AoDesc}$ loops (36°[34-40] vs. 43°[38-48] for β, 11°[3-15] vs 25°[13-30] for γ, $p<0.0001$). The ARX model simulated $P_{TFAoDesc}$ with a NRMSE of 93% [77-96]. β and γ obtained with Vel/$P_{AoDesc}$ and Vel/$P_{TFAoDesc}$ were similar and strongly correlated ($\rho=0.96, p<0.0001$) (Fig 1&2).
**Conclusion:** The location where the arterial pressure is monitored has a huge influence on the Vel/P loop parameters. Using a transfer function to estimate the pressure waveform at the site of the Doppler signal reduced those differences.




*[Figure 1. Sample data expressed in the time domain above and in a Vel/P loop below. The blue loop represents measured descending aortic pressure ($P_{Ao\ Desc}$) and constitutes the reference. Vel/$P_{TF\ Ao\ Desc}$ is a much more accurate estimation of Vel/ $P_{Ao\ Desc}$ than Vel/ $P_{Rad}$.]*




*[Figure 2. Boxplots for β and γ angles. Vel/$P_{Rad}$ loops systematically underestimate the angles]*

## 01AP04-5

### Effects of intraoperative protective lung ventilation on postoperative pulmonary complications in patients with laparoscopic surgery: prospective, randomized and controlled trial

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**Background and Goal of Study:** Respiratory functions are usually impaired during pneumoperitoneum for laparoscopic surgery. This randomized, controlled and single-blinded study was performed to evaluate whether intraoperative protective lung ventilation influences postoperative pulmonary complications after laparoscopic hepatobiliary surgery.
**Materials and methods:** Sixty two patients were randomized to receive either conventional ventilation with alveolar recruitment maneuver (tidal volume of 10 ml/kg with inspiratory pressure of 40 $cmH_2O$ for 30 s after the end of PnP, Group R), or protective lung ventilation (low tidal volume of 6 ml/kg with positive end-expiratory pressure [PEEP] of 5 $cmH_2O$, Group P). Induction and maintenance of anesthesia were done with balanced anesthesia. Respiratory complications such as atelectasis, pneumonia, or desaturation were observed postoperatively. Arterial blood gas analysis, peak inspiratory pressure and hemodynamic variables were also recorded. Results are presented as mean ± SD or number of patients (%).
**Results and discussion:** Postoperative pulmonary complications (P = 0.023) and desaturation below 90% (P = 0.016) occurred less frequently in group P than in group R. Eight patients of group R and 3 patients of group P showed atelectasis and pneumonia was diagnosed in 1 patient of group R. No differences were observed in arterial blood gas analysis (pH, $PaO_2$, $PaCO_2$, and $PAO_2$) and hemodynamic variables except $PAO_2$, $AaDO_2$ and peak inspiratory pressure between the two groups.
**Conclusion(s):** Protective lung ventilation (low tidal volume with PEEP) during pneumoperitoneum was associated with less incidences of pulmonary complications than conventional ventilation with alveolar recruitment maneuver after laparoscopic hepatobiliary surgery.
**Reference:**
Hazebroek EJ, Haitsma JJ, Lachmann B, Bonjer HJ (2002) Mechanical ventilation with positive end-expiratory pressure preserves arterial oxygenation during prolonged pneumoperitoneum. Surg Endosc 16:685-689

## 01AP04-6

### Intraoperative FiO2: Is practice following the evidence?

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**Background:** The use of 100% oxygen during intubation and extubation is common practice in anaesthetic rooms and theatres across the UK. There is uncertainty what the optimum FiO2 should be intraoperatively. An FiO2 of 100 is thought to cause atelectasis and cellular toxicity. Administration of 80% oxygen is associated with an increase mortality in cancer patients compared with 30%[1]. Other evidence shows high FiO2 decreases surgical site infection and does not increase the postoperative atelectasis[2]. The Royal Marsden (RMH) is a specialist cancer hospital treating a variety of pathology, all ages and ASA grade I-IV patients. We investigated if our use of FiO2 has changed from 2010 to 2015.
**Materials and methods:** RMH uses an automatic system where all clinical data is recorded from the start to the end of anaesthesia. The data captured automatically and therefore is not user dependent or subject to recall bias.
**Results:** There were 18529 patients over 6 years. The number of patients was lower in 2010 and 2015. The mean FiO2 decreased gradually from 61.33 in 2010 to 57.3 in 2014 and then sharply decreased to 36.03 in 2015. The case mix and the ASA of the patients have not changed over this time (data not shown).

| Year | No. of patients | Mean FiO2 |
|---|---|---|
| 2010 | 1451 | 61.33 |
| 2011 | 3555 | 61.10 |
| 2012 | 4072 | 60.20 |
| 2013 | 4177 | 58.30 |
| 2014 | 3540 | 57.30 |
| 2015 | 1734 | 36.03 |

*[Mean FiO2]*

**Conclusions:** The data shows a change in practice with a gradual reduction in FiO2 and a drop during 2015. There was a change in behaviour of our anaesthetists away from high FiO2, reflecting a desire to reduce the perceived side effects of high FiO2.Interestingly the literature to supports both high and relatively lower FiO2. This conflicting evidence is unhelpful to clinicians and a review of the evidence to create guidance is needed.
**References:**
1. Meyhoff CS et al. Increased long-term mortality after a high perioperative inspiratory oxygen fraction during abdominal surgery: follow-up of a randomized clinical trial. Anesth Analg. (2012) Oct;115(4):849-54
2.Hovaguimian, F et al, MR Effect of intraoperative high inspired oxygen fraction on surgical site infection, postoperative nausea and vomiting, and pulmonary function: Systematic review and meta-analysis of randomized controlled trials. Anesthesiology. (2013).Aug 119 303-16

## 01AP04-7

### Alveolar-arterial gradient and risk of hypoxemia in morbidly obese patients the day after laparoscopic bypass surgery: sustained effect of Boussignac CPAP?

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**Background and Goal of Study:** Morbidly obese patients develop more atelectasis during anesthesia which frequently persist twenty four hours after surgery and have and increased risk of desaturation in this period. Our aim was to evaluate the impact of immediate post extubation use of Boussignac Continuous Positive Airway Pressure (CPAP) on alveolar-arterial gradient (A-a gradient) and the prevalence of post-operative hypoxemia 24h after Roux-en-Y laparoscopic gastric bypass.
**Materials and methods:** A prospective study was conducted after hospital ethics committee approval. Patients with body mass index>35Kg/m2, age 18-65 years and American Society of Anesthesiologists class 1-3 were included. Exclusion criteria: preexisting lung parenchyma disease, chronic obstructive pulmonary disease, moderate to severe asthma, congestive heart failure, hemoglobin concentration lower than 7g/dl, language barriers or severe psychiatric disorder. Patients had the same anesthetic and analgesic protocols. Patients signed consent the day before surgery and were randomly assigned to receive Boussignac CPAP or venturi mask which were used immediately after extubation in the operating room and maintained during two hours in the recovery room. Hypoxemia (PaO2 <60mmHg) and A-a gradient were evaluated in the preoperative period (T0), 1h(T1) and 24h(T24) after extubation. Statistical analysis: categorical variables are presented as frequency and percentage and continuous variables are presented as mean±standard deviation; student's t and chi-squared tests were used. A p-value<0.05 was considered statistically significant.
**Results and discussion:** 11 patients were enrolled in each group. No differences in demographic and preoperative data. In the preoperative evaluation and at T1 there were no PaO2 values <60mmHg in both groups. At T24 no patient in the Boussignac group and 36% of patients in the venturi group had a PaO2 <60mmHg. There were no differences in pre-operative A-a gradient values between groups. After extubation it was significantly lower in the Boussignac group at T1 (148,9±75,9 versus 211,4±18,5; p=0.04) and T24 (27,8±7,9 versus 37,7±6,4; p=0.006) .
Venturi group patients are more prone to have hypoxemia.
**Conclusion(s):** A lower A-a gradient after extubation in the Boussignac group may be an indicator of a better ventilation/perfusion matching and suggest a positive effect of CPAP in the prevention of additional atelectasias after surgery.

## 01AP04-8

### Individualized positive end-expiratory pressure setting in obese patients during general anesthesia - a randomized controlled clinical trial using electrical impedance tomography

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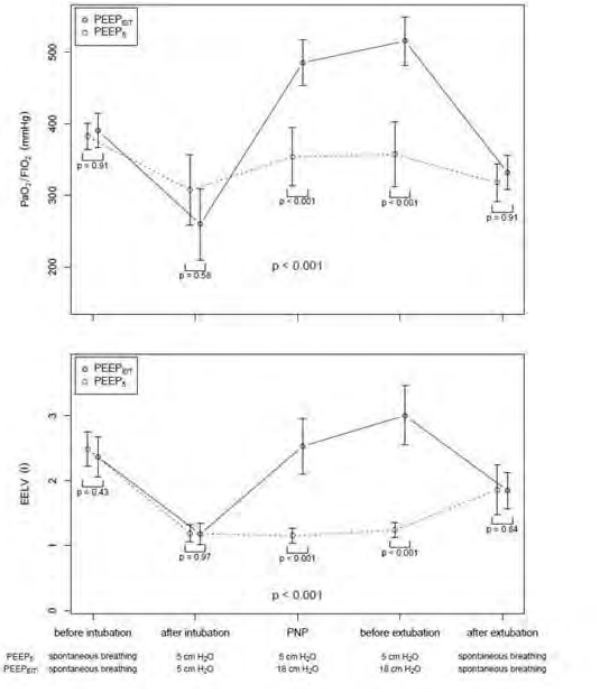
**Background and Goal of Study:** Obese patients develop atelectasis, reduced end-expiratory lung volume (EELV) and arterial oxygenation after induction of general anesthesia. Following a recruitment maneuver (RM) to reopen atelectasis, individualized setting of positive end-expiratory pressure (PEEP) can be achieved by minimizing lung inhomogeneity measured as regional ventilation delay index (RVDI), which is based on Electric Impedance Tomography (EIT) and correlates with lung recruitment and collapse. We hypothesized that an EIT-based individualized PEEP ($PEEP_{EIT}$) after a RM will improve EELV, lung mechanics, and arterial oxygenation as compared with a standard PEEP in morbidly obese patients undergoing elective laparoscopic surgery.
**Materials and methods:** Approval for the trial was granted by the Leipzig University Ethics committee and all patients gave written informed consent prior to inclusion. Fifty patients with a body mass index (BMI) ≥35 kgŸm$^{-2}$ received mechanical ventilation with a tidal volume of 8 mL/kg predicted body weight and (1) a RM followed by titrated $PEEP_{EIT}$, or (2) no RM and PEEP of 5 $cmH_2O$ ($PEEP_5$). Gas exchange, lung mechanics, and EELV (multi-breath nitrogen washout) were determined.
**Results and discussion:** $PaO_2/F_IO_2$ and EELV decreased by 116 mmHg (95%CI 80 to 152 mmHg, p<0.001) and 1.23 L (95%CI 0.87 to 1.58 L, p<0.001) after intubation (Figure 3). $PEEP_{EIT}$ amounted 18.5±5.6 $cmH_2O$. $PaO_2/F_IO_2$ before extubation was 171 mmHg higher in the $PEEP_{EIT}$ arm (95%CI 123 to 218 mmHg; p<0.001) and EELV was 1.8 L larger (95%CI 1.5 to 2.2 L; p<0.001). After extubation, however, the differences between the arms vanished.
**Conclusions:** Titrated $PEEP_{EIT}$ was found to be substantially higher than PEEP currently used in obese patients and improved EELV, lung mechanics, and oxygenation during anesthesia. Future interventions should also include the time after extubation.
**Reference:** Muders T et al. Tidal recruitment assessed by electrical impedance tomography and computed tomography in a porcine model of lung injury. Crit Care Med 2012; 40: 903-911.




*[Figure 1. Course of $PaO_2/FIO_2$ and EELV over time for the two groups. Points represent means and whiskers 95% confidence intervals from the data at that given time point (i.e. not from the repeated measures ANOVA). The mean PEEP value is provided below for each point in time. EELV = end-expiratory lung volume; $FIO_2$ = fraction of inspired oxygen; $PaO_2$ = partial pressure of oxygen in arterial blood; PEEP = positive end-expiratory pressure; PNP = pneumoperitoneum]*

## 01AP04-9

### Oxygen Reserve Index (ORI): validation of a new variable

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**Background and Goal of Study:** Monitoring a patient's oxygen status during anesthesia with pulse oximetry is essential. The new Oxygen Reserve Index (ORI), a relative indicator of the partial pressure of oxygen in arterial blood ($PaO_2$) in the range of 100 to 200 mmHg, may serve clinicians as a warning of an impending hypoxic state. We validated ORI by comparing optical data from the pulse oximeter to whole blood references of arterial and venous blood drawn in healthy volunteers.
**Materials and methods:** In this prospective, first in human validation intervention study, 20 healthy volunteers (age 24±6 yr, BMI 24±3 kg m$^{-2}$) were breathing via a tight fitting facemask standardized oxygen concentrations ranging from mild hypoxia ($FiO_2$ 0.14) to hyperoxia ($FiO_2$ 1.0). ORI was measured non-invasively by multiwave pulse co-oximetry (Rainbow SET, Masimo Corp.) to differentiate between normoxic and hyperoxic states by scaling the measured absorption information between 0.00 and 1.00. These ORI values were validated against $PaO_2$ values obtained from repeated arterial blood samples. In this preliminary analysis, we examined the correlation between changes in ORI (ΔORI) and $PaO_2$ ($\Delta PaO_2$) using sensitivity/specificity and concordance analyses. Furthermore, we performed regression analysis to compare absolute values and changes in ORI and $PaO_2$.
**Results and discussion:** Sensitivity and specificity as well as concordance of ΔORI vs. $\Delta PaO_2$ were high (mostly above 90%, for details see table 1). Absolute ORI and $PaO_2$ values were positively correlated ($r^2 = 0.63$; p<0.001). The same holds true for ΔORI and $\Delta PaO_2$ values ($r^2 = 0.59$; p<0.001).

| PaO2 ref (mmHg) | Samples [n] | Sensitivity | Specificity | Concordance |
|---|---|---|---|---|
| 110 | 710 | 80.9 | 99.3 | 98.0 |
| 120 | 892 | 95.9 | 91.2 | 92.3 |
| 130 | 941 | 91.6 | 02.9 | 92.5 |
| 140 | 1029 | 93.0 | 93.2 | 92.5 |
| 150 | 1047 | 95.8 | 91.4 | 93.7 |
| 160 | 1071 | 94.8 | 89.4 | 92.6 |
| 170 | 1088 | 94.6 | 90.9 | 93.3 |
| 180 | 1028 | 94.8 | 90.0 | 93.4 |
| 190 | 1035 | 94.8 | 85.4 | 92.3 |

*[Table 1 Sensitivity/Specificity and Concordance]*

**Conclusion(s):** In the flat part of the haemoglobin-oxygen binding curve, where oxygen saturation is >97%, a decrease in ORI indicates a falling $PaO_2$ prior to oxygen desaturation. As such, the non-invasive and continuously available ORI may offer additional information at maximum $SpO_2$ values and help guide clinicians in estimating the body's oxygen reserve.

## 01AP04-10

### Pressure-regulated volume control ventilation

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**Background and Goal of Study:** Adjustment of ventilatory settings and ventilatory mode in laparoscopic gynecologic surgery for improved mechanical ventilation performance during anesthesia is important.
**Materials and methods:** This study is a randomized controlled trial in 32 patients who were scheduled for elective gynecological laparoscopic surgery with general anesthesia. All patients were randomly allocated to 2 groups to use volume controlled ventilator mode (group VCV, n = 16) or use pressure regulated volume controlled ventilator mode (group PRVC, n = 16) under general anesthesia.
Various respiratory parameters were measured at 10 min after induction and 30, 60, and 120 after Trendelenburg positioning. A Shapiro-Wilk test was used to determine distribution normality. A Student *t* test was used to compare continuous data between study groups and a repeated measures ANOVA was used to compare all interval data.

**Results and discussion:** There were no significant differences in demographic data between groups. Between the groups there were significant differences in heart rate and at 10 min after induction, and heart rate and peak airway pressure 30, 60, and 120 min after Trendelenburg positioning ($P < 0.05$). However, there were no significant differences in blood pressure or minute ventilation. There were no significant differences in dynamic compliance between the groups.
**Conclusion(s):** PRVC is a safe alternative choice for laparoscopic gynecologic surgery because of lower peak airway pressure that might lower the risk of lung injury compared with VCV.

## 01AP04-11

### Effects of positive end expiratory pressure on intracranial pressure during pneumoperitoneum and trendelenburg position in a porcine model

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**Background:** Anesthesia management of minimally invasive surgery is a challenge because pneumoperitoneum combined with steep Trendelenburg position causes ventilation problems and results in an increased intracranial pressure (ICP). Positive end expiratory pressure (PEEP) is applied for managing hypoxia during these surgeries but PEEP may worsen the increase in ICP. This study was designed to evaluate the effects of PEEP level on ICP and cranial perfusion.
**Methods:** This study was approved by Ethical Committee of Animal Experiments of Gazi Medical University. Ten male Yorkshire pigs weighing 30±5 kg were included. All the animals were intubated and ventilated mechanically by volume control mode. Pneumopertoneum was maintained at a pressure of 15 mmHg and the animals were placed at 45 decrease of Trendelenburg positon. After 30 min of stabilization period, PEEP titration was started at a PEEP of 5 $cmH_2O$ with a stepwise increase of 5 $cmH_2O$ until a plateau PEEP of 20 $cmH_2O$ followed by a stepwise reduction of the PEEP to a minimum of 5 $cmH_2O$. PEEP changes were done every 3 min, and complete data with blood drawings were collected after each 5-mbar PEEP change (measurement points: baseline, PEEP 0, 5, 15, 20, 15d, 10d, 5d, 0). Hemodynamic variables, parameters of oxygenation [partial pressure of arterial oxygen/inspiratory fraction of oxygen ($PaO_2/FiO_2$)], ventilation [arterial and end tidal carbon dioxide ($PaCO_2$, $etCO_2$)], and ICP were recorded. ICP was monitored by using a ventricular drainage system. Brain perfusion pressure (BPP) and arterial end tidal carbon dioxide gradient (P (a-et) $CO_2$) were calculated. The analysis of changes between measurement points within each group the Friedman test followed by Wilcoxon's signed rank test were performed. A p value of $<0.05$ was considered statistically significant.
**Results:** Pneumoperitoneum and Trendelenburg position resulted in significant deterioration of oxygenation ($PaO_2/FiO_2$: $p = 0.002$) and ventilation ($PaCO_2$: $p = 0.002$). PEEP at the levels of 10, 15, 20 significantly improve gas exchange but increase ICP and decreased BPP. This difference was significant at incremental PEEP 10 and 20 and at decremental PEEP 20d and 10d for ICP and BPP.
**Conclusion:** PEEP is effective proving oxygenation and ventilation during pneumoperitoneum combined with steep Trendelenburg position but ICP increase and BPP decrease are restrictive effects of PEEP application.

## 01AP04-12

### Lung Ultrasound to detect anesthesia-induced atelectasis in adult healthy patients

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**Introduction:** Atelectasis occurs in about 90% of all patients who are anesthetized [1]. Lung Ultrasound provides relevant information on the state of lung aeration [2]. We wanted to evaluate atelectasis formation soon after anesthesia and to detect any difference in the study population.
**Materials and methods:** We enrolled 86 healthy (ASA 1 and 2), young (<65 years), female patients, undergoing general anesthesia for hystero resection without complications and with an anesthesia no longer then one hour. We evaluated the lung with a convex probe, in twelve dorsal areas above the diaphragm, before anesthesia (T0) and soon after (T1). We counted the B lines from 0 to 10, we quantified the C lines (small subpleural consolidations) from 1 to 3 and we defined atelectasis as the presence of at least three B lines or a C line in an intercostal space [3]. We also calculated the lung ultrasound score as described by Via [2].
**Results and discussion:** 84 patients completed the study, mean age: 48,5±9, BMI: 24,7±5 and smokers 29%. The procedure lasted 36±8 min. and nearly all the patients developed atelectasis (94%). The number of B lines, C lines and the lung score, all increased significantly. B lines T0: 1[0-2] T1: 17,5[9-34]; C lines T0: 0[0-0] T1: 3[1-7]; lung score T0: 0[0-0] T1: 7[3-15] (Wilcoxon signed ranks test $p<0,0001$). We found no differences in relation to age, BMI or smoke habit, but patients with a shorter procedure (less then 35 min.) developed fewer C lines: 2[1-3,5] vs. 5[1-9] (Mann-Whitney test $p=0,02$). Our findings are very similar to those obtained by Hedenstierna with chest CT scans [1].
**Conclusion:** Lung Ultrasound is a reliable, safe and repeatable method to detect anesthesia-induced atelectasis in adult healthy patients.
**Reference:**
1. Hedenstierna G, Edmark L. Mechanism of atelectasis in perioperative period. Best Pract Res Clin Anaesthesiol. 2010 June; 24(2): 157-69
2. Via G, Storti E, Gulati G, et al. Lung Ultrasound in the ICU: from diagnostic instrument to respiratory monitoring tool. Minerva Anestesiol. 2012; Nov 78(11): 1282-96
3. Lichtenstein DA. Whole Body Ultrasonography in the Critically ill. Berlin: Springer-Verlag; 2010

## 01AP05-1

### Cognitive dysfunction rehabilitation using Mentalplus® digital game. A possible future tool to cognitive rehabilitation in POCD

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**Background and Goal of Study:** POCD remains a common postoperative complication associated with higher morbidity and mortality, especially in elderly patients. Research on digital games may not relate directly to postoperative cognitive dysfunction, but it can illuminate the possibilities of games related cognitive improvement in people with cognitive dysfunction[1]. MentalPlus® is a digital game developed first to evaluate the cognitive dysfunction, in special POCD.
This study investigated the association between the use of MentalPlus® game series of sessions in elderly patients with cognitive dysfunction and their results after them. Based on these findings, the scientific community could have interest to develop a major project to evaluate the impact of its usefulness for POCD rehabilitation.
**Materials and methods:** A total of 17 volunteers elderly patients,mean age of 64 years, with diagnosed cognitive dysfunction based on usual neuropsychological test battery (TICS, VLT, STROOP, TMT A/B and SDMT) went through ten sessions on MentalPlus® game. MentalPlus® game sessions focused on attention, memory and executive functions. Patients` cognitive functions were evaluated in two moments: before the first and after the last session use. Each session consisted of 25 minutes each play per day. The primary outcome was an evaluation of each battery test score before and after the MentalPlus® game ten sessions.
**Results and discussion:** Due to the small sample size, we present only descriptive data: TICS, VLT, STROOP, TMT A/B and SDMT The scores presented in both times were (mean;SD): TICS( 25.3 ;3.4 and 28;1.1), VLT1,2,3 and delay:(8;1.6 and 11;1.4),(8;2 and 11.5;1.3),(11;1.3 and 12.5;1.4),(11.3;1.2 and 13;1), STROOP(time) 1,2 and 3 (128;23 and 110;12),(150;25 and 127;16),(157;21 and 133;14), TMT-A (32;24 and 34;13), TMT-B (39;9 and 30;10), SDMT(72;18 and 73;12). The results showed an improvement in diverse neuropsychological tests applied before and after the 10 MentalPlus® game sessions for the 17 patients.
**Conclusion:** This positive pilot results in cognitive rehabilitation using MentalPlus® game can suggest a possibility for future use in POCD rehabilitation.
**Reference:**
Blumberg FC, Fisch SM.
**Introduction:** digital games as a context for cognitive development, learning, and developmental research. New Dir Child Adolesc Dev. 2013;2013(139):1-9.

## 01AP05-2

### The end-tidal desflurane concentration for maintaining bispectral index below 50 in adult patients

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**Background and Goal of Study:** Bispectral index (BIS) target below 50 is considered to be appropriate for unconsciousness during general anaesthesia in adult patients. Minimum alveolar concentration for maintaining BIS below 50 ($MAC_{BIS50}$) of sevoflurane has been reported to be 0.97% in adult patients and to decrease with advancing age [1]. Desflurane has rapid onset and offset, and is widely used for general anaesthesia, preferably in obese and elderly patients. Thus, we evaluated the $MAC_{BIS50}$ of desflurane in different age groups. We hypothesised that $MAC_{BIS50}$ of desflurane decreases with advancing age in adult patients.
**Materials and methods:** Sixty patients, American Society of Anesthesiologists physical status I and II, aged 10 to 66 years, who were scheduled for elective surgery under general anaesthesia, were enrolled in the study. They were divided into 10-19 year-old, 20-39 year-old, and 40-69 year-old groups. Anaesthesia was induced with 5% sevoflurane in 6 $l.min^{-1}$ oxygen by using the incremental increase technique via a face mask. After obtaining muscle relaxation using rocuronium 0.7 $mg.kg^{-1}$, i-gel was inserted. Then, the volatile anaesthetic agent was changed from sevoflurane to desflurane. The end-tidal desflurane concentration was maintained at 4.0% for 10 min to allow equilibration with cerebral anaesthetic partial pressure followed by a 1 min assessment of BIS taken at 10-sec intervals. BIS data were obtained from an average of 6 BIS values in 1 min, and recorded. The end-tidal desflurane concentration at which BIS was measured was predetermined by the up-down method (with 0.2% as a step size). $MAC_{BIS50}$ was determined using Dixon's up-down method.
**Results and discussion:** $MAC_{BIS50}$ of desflurane was calculated to be 4.17%, 3.53%, 3.33% in the 10-19 year-old, 20-39 year-old, and 40-69 year-old group, respectively. $MAC_{BIS50}$ of desflurane decreases with advance in age ($P = 0.007$), which is similar to sevoflurane. We were able to examine $MAC_{BIS50}$ more accurately using the protocol that had small step size of desflurane and excluded drugs that could affect BIS value.
**Conclusion:** These results indicate that we can maintain BIS below 50 with less end-tidal desflurane concentration with aging.
**Reference:**
1. Br J Anaesth 2009; 102: 331-5.

## 01AP05-3

### Dynamic resting-state fMRI during ketamine anaesthesia

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**Background and Goal of Study:** How does ketamine affect the brain neuronal dynamics during anaesthesia? Resting-state functional MRI (rsfMRI) is increasingly applied to explore spontaneous brain fluctuations during wakefulness and under anaesthesia through the analysis of functional connectivity (FC). It has been reported that long-range resting-state FC persists under general anaesthesia [1].
A new method of rsfMRI analysis, called dynamic resting-state fMRI (D-rsfMRI), allows analysing the changes of FC within fMRI sessions instead of averaging FC analysis over the MRI scanning session. We previously demonstrated that under propofol anaesthesia, dynamical FC changes correlated with the brain white matter structure, suppressing the rich repertoire of brain states that exists in the awake state [2].
Here we used the D-rsfMRI method to compare dynamic FC between wakefulness and ketamine anaesthesia in non-human primates.
**Materials and methods:** Four rhesus macaques were included. All procedures were conducted in accordance with the European Directive (2010/63/UE) and were approved by the institutional Ethical Committee. Monkeys were scanned at a 3T fMRI with no task (resting-state) during the awake state or ketamine anaesthesia. Simultaneous EEG recording ensured for a consistent level of anaesthesia across animals and sessions. We used sliding-window correlations to analyse dynamical FC (D-rsfMRI) data [2,3].
**Results and discussion:** Under ketamine anaesthesia, the brain still exhibits rich FC patterns, but the remaining connectivity patterns become strongly related to the underlying anatomical connectivity and lack negative correlations. The awake resting-state, however is characterized by a high degree of temporal flexibility with a greater variety of brain states.
**Conclusion:** These results suggest that the temporal dynamics of spontaneous brain activity and specifically its independence from established anatomical routes are altered under ketamine anaesthesia, just like we previously observed under propofol anaesthesia [2]. This leads to generalise our D-rsfMRI signature of consciousness. Whatever the pharmacological agent, anaesthesia parallels a shift in dynamical functional connectivity leading to rigid low information brain functional configurations.
**References:**
1. Vincent JL et al. (2007) Nature
2. Barttfeld P, Uhrig L et al. (2015) Proc Natl Acad Sci U S A
3. Allen EA et al. (2014) Cereb Cortex

## 01AP05-4

### Preoperative predictors of postoperative cognitive dysfunction after y-graft replacement for abdominal aortic aneurysm

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**Background and Goal of Study:** Postoperative cognitive dysfunction (POCD) is believed to result from operative stress. It prolongs hospital stays, lowers quality of life, and hastens mortality. Y-graft replacement is a highly invasive procedure and should lead to an elevated rate of subsequent POCD. This has not been shown in the few reports of preoperative predictors of POCD after Y-graft replacement. This study sought to identify the preoperative predictors of POCD after Y-graft replacement.
**Materials and methods:** We retrospectively reviewed the medical records of patients who underwent Y-graft replacement for Abdominal aortic aneurysm (n=65) between July 2010 and September 2013 at Kumamoto Chuo Hospital. Surgeries were performed under either general anesthesia or combined general and epidural anesthesia. POCD was measured by 4 neuropsychological tests: Hasegawa dementia scale (HDS: modified Mini-Mental State Examination), Kana pick-up test, Digit symbol test, and Digit span test. The tests were applied preoperatively (baseline) and one week post-operatively. POCD was defined as a decrease of at least 20% of baseline in performance post operatively in at least 1 test. Comparisons between POCD group and non-POCD group were made with Student's t test and the $\chi^2$ or Fisher's exact test. Stepwise logistic regression analysis assessed the predictors and probability of POCD.
**Results and discussion:** POCD was identified in 24 of the 65 patients (37.0%). The group with POCD were significantly ($p<0.05$) older (75.2 ± 6.71 vs 70.6 ± 6.72), had lower neuropsychological scores (HDS 25.3 ± 3.2 vs 28.4 ± 1.9, Kana pick-up 20.2 ± 10.4 vs 28.2 ± 12.7, and Digit symbol 30.5 ± 11.6 vs 41.1 ± 11.3. Stepwise regression found the significant predictors of POCD to be history of cerebrovascular disease (CVD) [odds ratio (OR) 3.04], older than 74 y (OR 4.47), and 28 or below in HDS (OR 7.76). The probability of POCD with 3 risk factors was 0.969. The lower HDS score may reflect decreasing cognitive reserve due to CVD and aging. No MRI exams were made preoperatively.
**Conclusions:** The incidence of POCD after Y-graft replacement was 37.0% (24 / 65). Cerebrovascular disease, age, HDS were preoperative predictors of POCD. HDS may be useful to evaluate POCD before surgery in elderly patient with history of CVD.

## 01AP05-6

### The minimum alveolar concentration (MAC) of sevoflurane for maintaining the bispectral index below 50 during noxious stimulation

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**Background and Goal of Study:** The minimum alveolar concentration (MAC) for maintaining the bispectral index below 50 (MAC-BIS50) of sevoflurane during a resting state has been reported. However, the MAC-BIS50 of sevoflurane during noxious stimulation has never been determined, and this index may provide clinically useful information. The depth of the anesthesia will decrease under noxious stimulation, and lead to a risk of awareness during the operation. It is reported that tetanic stimulation of 80 mA is equivalent to a skin incision. We investigated the MAC-BIS50 during tetanic stimulation (MAC-BIS50-tetanus) of sevoflurane.
**Materials and methods:** The study was performed following institutional review board approval and after written informed consent was obtained from each patient, without psychotic disease, neurological disorder, and dementia. H2 blocker was solely used as a premedication, and anesthesia was induced with sevoflurane and 50-60% of nitrous oxide in 40-50% of oxygen and air. Under an adequate neuromuscular blockade with 0.6 mg/kg of rocronium, supraglottic device (i-gel or LMA proseal) was introduced. Anesthesia was maintained with a predetermined end-tidal concentration of sevoflurane in oxygen and air, and we confirmed that the end-tidal nitrous oxide concentration was below 5%. Tetanic stimulation of 80 mA was applied for 10 seconds to the ulnar nerve with a TOF monitor, and the recorded BIS values for 3 minutes at 10-s intervals during before-and-after stimulation. Since our BIS monitors had a 30-s lag, so we defined that the average of the BIS values at 30-s after the stimulations was as the BIS value when tetanic stimulation was applied. The MAC-BIS50 of sevoflurane at in middle-aged patients has been reported to be 0.97%; we started at 1.2 % and determined the MAC-BIS50-tetanus by Dixon's up-and-down method.
**Results and discussion:** We studied 19 adult patients (41-69 yr). The MAC-BIS50-tetanus of sevoflurane was 1.38 % (SE 0.03, 95% CI 1.32-1.44 %).
**Conclusion(s):** The MAC-BIS50-tetanus of sevoflurane was 1.38 % (95% CI; 1.32-1.44 %). It was suggested that a half of patients during general anesthesia with a 1.38 % end-tidal concentrations of sevoflurane would have a BIS value more than 50 when noxious stimulation is applied.

## 01AP05-7

### Risk factors involved in the onset of postoperative delirium after transurethral prostatectomy in elderly - a retrospective study

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**Introduction:** The elderly represent a large cohort of patients undergoing urological procedures in which transurethral prostatectomy (TURP) is one of the most frequently performed.
**Aim of this study:** To investigate the incidence of postoperative delirium (POD) in elderly patients undergoing monopolar TURP for benign prostatic hyperplasia (BPH) and to identify the risk factors involved in the onset and severity of POD.
**Material and method:** 240 patients aged over 70 years underwent elective surgery for BPH in our Department in the last 2 years. Pts. were evaluated preoperatively, immediately postoperative and at 5 days after surgery. Inclusion criteria: spinal anesthesia; preoperative minimental state examination (MMSE)>27. Pts. with preoperative antidepressants or who developed post-TUR syndrome were excluded. Delirium was diagnosed using the Confusion Assessment method (CAM). After surgery, patients were divided into 3 groups based on POD severity (no delirium, lasted 2-3 days and >4 days). Intraoperative data included operating time, TAM, HR, SpO2, rectal temperature, blood loss, volume of rinsing liquid used. POD treatment consisted in titrated haloperidol; pain management and non-pharmacological measures. For comparison between these 3 groups we used Mann-Whitney U test for continuous data, Kruskall Wallis test for non parametric variables and $\chi^2$ test for ordinal data.
**Results:** Median age was 76.3 (70-87). POD occurred in 27 pts (11.25%), with 17 (7.08%) and 10 (4.16%) pts. developed short and prolonged POD, respectively. Mean hospital stay was 5.4, 7.3 and 12.6 days for the 3 groups, respectively ($p<0.004$). 5 (2.08%) pts. required endoscopic revision after POD onset but no significant surgical complication (Clavien grade>3a) was recorded. Age>76, marital status, alcohol use disorders, preoperative urinary catheterization were found to be preoperative predictors for onset of POD. Prolonged POD was associated with intraoperative Hb drop>2g/dL, increased operative time>60 min and decrease of intraoperative body temp<36,5$^0$ C. MMSE did not correlate with POD severity in this cohort.
**Conclusions:** Reducing the operative time, usage of preheated rinsing liquids in association with specific treatment may decrease POD morbidity and hospitalization costs.
**Reference:**
American Geriatrics Society Expert Panel on Postoperative Delirium in Older Adults: Postoperative delirium in older adults, J Am Coll Surg. 2015 Feb;220(2):136-48.e1

## 01AP05-8

### Correlation between Bispectral Index and endtidal sevoflurane concentration during maintenance of anesthesia in intellectually disabled patients

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**Background and Goal of Study:** Adjusting the anesthetics' dose in intellectually disabled (ID) patients is particularly challenging. In order to better understand how the bispectral index (BIS) behaves in ID patients, the correlation between BIS and the endtidal sevoflurane (EtSevo) was examined in this study.
**Materials and methods:** 9 ID patients, 19±10 years old, 43.4±17.3Kg, ASAII/III scheduled for oral procedures were enrolled. None of the patients were cooperative to allow monitoring before induction. Anesthesia was induced with 8% sevoflurane in oxygen through facemask. After induction, a BIS sensor was placed in the patient's and connected to a BIS Vista® monitor. Rugloop Waves® software was used to continuously record the BIS, as well hemodynamic and ventilatory parameters. Maintenance of anesthesia was with sevoflurane with air adjusted to clinical signs by an anesthesiologist blinded to the BIS value. None of the patient received opioids.
Data recorded were selected: from the first time that the BIS value decreased below 60 until the last time that the BIS value increased above 70. Graphpad Prism was used for statistical analysis. Spearman Rank r correlation coefficient was calculated between BIS and EtSevo for each patient.
**Results and discussion:** Average BIS was within, or below, what are considered adequate levels (between 40 and 60) with only one patient showing average high BIS levels. We observed correlation values obtained for each patient. In 6 out of 9 patients there was a significant negative correlation between BIS and EtSevo.
In the remaining 3 there was no correlation between BIS and EtSevo. These patients corresponded to a patient with ID consequent to asphyxia, a patient with LennoxGastaut and anoxic encephalopathy and another with cerebral palsy and congenital hydrocephaly. All 3 patients were taking antiepileptic medication.
Two of the patients that had no correlation between BIS and EtSevo had the higher average BIS values of the study sample, but this was not accompanied by the lower average EtSevo and MAC values. Some ID patients may have background conditions that limit the use of BIS for depth of anesthesia monitoring. BIS, seems to be either similar or lower from what would be seen in normal brains, but not higher.
**Conclusions:** Most patients from this study, the BIS seemed capable of reflecting the Et levels. More patients will be enrolled to better define the usefulness of BIS and help titrate anesthesia in ID patients.

## 01AP05-9

### Comparison of three NIRS devices for the measurement of microvascular reactivity

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**Background and Goal of Study:** An increasing number of NIRS devices are used to provide measurements of microvascular reactivity. The interchangeability of the different devices is however unclear.
The aim of the present study is to analyse tissue oxygenation measurements by three different NIRS devices during a vascular occlusion test (VOT). The hypothesis is that measurements from the different devices are similar.
**Materials and methods:** Forty consenting adults scheduled for elective CABG surgery were recruited. Three disposable NIRS sensors (INVOS 5100C; Foresight Elite and NIRO-200NX) were applied to the left forearm over the brachioradial muscle. A standard blood pressure cuff at the upper arm was inflated to a pressure of 50 mmHg above the individual systolic pressure. After 3 minutes of ischaemia, cuff pressure was rapidly released. Tissue oxygenation (StO2) measurements included baseline StO2 (BL), occlusion slope (OS), minimum value at end of ischaemia (Min), reperfusion slope (RS), maximum value after cuff release (Max) and recovery time (tR) defined as the time interval from minimum value until return to baseline after the hyperaemic phase.
Comparisons between devices were performed with the Kruskal-Wallis test. Pairwise differences among devices were examined with the Mann-Whitney U test.
**Results and discussion:** Data are presented as median [IQR]. There were no significant differences at baseline. Pairwise comparisons between devices significantly show that INVOS has higher occlusion slopes, lower minimum values and higher reperfusion slopes, while NIRO has lower maximum values and Foresight has longer recovery times compared to the two other devices.

| | INVOS 5100C | Foresight Elite | NIRO-200NX |
|---|---|---|---|
| BL (%) | 66 [61-73] | 70 [65-73] | 69 [65-73] |
| OS (%/min) | 15 [11-21]* | 11 [8-13] | 12 [9-15] |
| Min (%) | 36 [21-48]* | 45 [40-51] | 46 [36-51] |
| RS (%/min) | 311 [92-523]* | 114 [65-199]* | 202 [88-269]* |
| Max (%) | 82 [77-86] | 81 [78-87] | 79 [75-82]* |
| tR (s) | 181 [146-223] | 226 [181-266]* | 187 [127-248] |

*[Table]*
* $p<0.05$ vs. the two other devices

**Conclusion:** Although no significant differences were found at baseline, analysis of different parameters of microvascular reactivity shows that different information is retrieved depending on the NIRS device used. This phenomenon should be kept in mind when using NIRS as monitoring technique for tissue oxygenation, especially during VOT.

## 01AP05-10

### Bispectral index monitoring of a lithium-medicated patient with bipolar disorder

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**Background:** Bipolar disorder is a psychiatric condition usually treated with lithium. This drug may display EEG abnormalities which are generally proportional to plasma concentrations: diffuse slow activity, spikes and triphasic waves. This case report describes changes in bispectral index (BIS) values in a lithium-medicated patient with bipolar disorder during general anaesthesia for oncological surgery.
**Case report:** A 60-year old female patient (47kg,1.53m) with bipolar disorder, treated with carbolithium (300mg 3 times a day), was submitted to hysterectomy and retroperitoneal and iliac lymphadenectomy due to recurrent colon cancer. In the operating room, the patient was monitored for cardioscopy, $SpO_2$, NIBP and BIS. Epidural block was achieved with morphine (2mg) and ropivacaine (45mg), followed by sufentanil (20mg), propofol (80mg) and cisatracurium (2.5mg), i.v. She was intubated and maintenance was done with desflurane and remifentanil (effector site). The patient remained with a heart rate of 96-74 bpm, mean arterial pressure of 109-76mmHg and no significant intraoperative bleeding. BIS values remained low (25-45) and the burst suppression rate (BSR) was $\neq 0$ (1-13) despite low targets of remifentanil infusion (0.5-1.2ng/dL) and low end-tidal desflurane concentrations (0.7-1.5%). Recovery was satisfactory, with discharge on the 7th postoperative day.
**Discussion:** In general, EEG changes induced by anesthetics initially produce excitation and frontal alpha rhythm. As the depth of anesthesia increases, waves become slower and the voltage increases (with the exception of ketamine). The stability of the hemodynamic variables suggest cerebral perfusion was not compromised in our patient, but the lithium neuronal suppressive metabolic effects, associated to toxicity intrinsic of the anesthetics produced low BIS values and BSR $\neq 0$.
**Reference:**
1. Bauer G, Bauer R. EEG, Drug Efects, and Central Nervous System Poisoning. in: Schomer DL, Silva FHL. Niedermeyer's Electroencephalography: Basic Principles, Clinical Applications and Related Fields, 6th ed., Lippincott Williams & Wilkins, 2011;901-22.
**Learning points:** Regular use of CNS-altering medication by some patients can lead to EEG abnormalities during anesthesia.

## 01AP05-11

### The effects of sevoflurane and propofol anesthetics for regional cerebral oxygen saturation during the operation of lower extremities with pneumatic tourniquet

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**Background and Goal of Study:** It is known that hemodynamic status changes by deflating the pneumatic tourniquet during lower extremity surgery, especially with elderly patients and it sometimes triggers severe complications. Therefore, recent studies suggested that we should monitor the cerebral oxygen saturation during those operations.
It was shown that cerebral oxygen saturation reflects the balance between cerebral oxygen demand and supply, and is used to detect cerebral ischemia. Anesthetic agents are known to have variable effects on cerebral hemodynamics and intra cranial pressure. The goal of this study was to determine whether regional cerebral oxygen saturation (rSO2) values differ between propofol and sevoflurane anesthesia during lower extremity surgeries that require pneumatic tourniquet.
**Materials and methods:** Thirty-four patients undergoing operation of lower legs were randomly divided into sevoflurane and propofol groups. The patients with The American Society of Anesthesiologists physiological status 1 or 2 and without past history of cerebral disease were included in this research. Physiological parameters and rSO2 were recorded under general anesthesia. At 5 min before, and 5, 10 and 15 min after deflation of pneumatic tourniquet. We also performed arterial blood gas analysis at the same time points. The patients were followed for a week after the operation to record complications.
**Results and discussion:** Sevoflurane group had significantly higher rSO2 values than propofol group throughout the observational period. ($p=0.02$, 0.011, and 0.11) Sevoflurane group indicated continuous increase in rSO2 after deflation. However, propofol group showed decline in rSO2 values after deflation, though it regained within the recording period. Physiological parameters, arterial blood gas analysis data and MAP were not significantly different between the groups. There were no significant differences between the groups in terms of the post-operative complication.
**Conclusion(s):** There were significant differences between the anesthetics on rSO2 when the pneumatic tourniquet was deflated. Sevoflurane group indicated higher levels of rSO2 during recording period than propofol group. When deflating the tourniquet, inhalator anesthetics might be effective to maintain the cerebral blood flow and to avoid following neurologic complications.

## 01AP06-1

### Sevoflurane sedation in a rat model of sepsis: systemic and neuro-inflammation

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**Background:** Volatile anesthetics such as sevoflurane have shown anti-inflammatory properties in various organs and settings [1]. We were interested in evaluating safety aspects as well as the potential of sevoflurane to reduce neuro-inflammation in sepsis.
**Methods:** Adult male Wistar rats were subjected to intravenous injection of 1mg/kg lipopolysaccharides (LPS) or sham procedure (phosphate-buffered saline, PBS). They were randomly assigned to sedation with propofol or sevoflurane for 12h. Blood samples were taken every 3h. The inflammatory mediators cytokine-induced neutrophil chemoattractant protein-1 (CINC-1) and monocyte chemotactic protein-1 (MCP-1) were evaluated in serum and brain tissue. Brain damage markers mRNA s100B, transforming growth factor β (TGF-β) and glial fibrillary acidic protein (GFAP) as well as wet-to-dry ratio were assessed. Statistical analysis was performed using one way analysis of variance, $p<0.05$ was considered significant.
**Results:** There was no difference with regard to ventilation or mean arterial blood pressure in the two sedation groups. Pro[BB1] -inflammatory cytokines were upregulated with a clear peak at 12h in the propofol and sevoflurane sepsis group (CINC-1: 401±305 vs 96±44ng/ml; MCP-1 4.82±1.92 vs. 2.51±0.54μg/ml; both $p<0.001$). Also brain CINC-1 and MCP-1 proteins were increased upon LPS injection, however, with similar values in both sedation groups. Brain damage markers s100B, TGF-β and GFAP were decreased by 2%, by 25% and increased by 43% by sevoflurane, respectively, but without reaching statistical significance ($p= 0.99$, 0.35 and 0.42). Wet-to-dry ratio was increased in septic animals, but not affected by the sedative regimen (propofol: 4.89±0.07[BB2] vs. sevoflurane 4.80±0.07, $p=0.23$).
**Conclusion:** Sevoflurane could be a safe alterntive for sedation in septic patients also with regard to neuro-inflammatian, offering at the same time a systemic anti-inflammatory potential.
**Reference:**
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## 01AP06-2

### Differential inflammatory effects in the brain and post operative cognitive performance from surgical trauma when compared with anaesthesia exposure without surgery

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**Background and Goal of Study:** Postoperative cognitive dysfunction (POCD) is associated with abnormal tau protein phosphorylation and neuroinflammation, findings commonly seen with Alzheimer's Disease[1,2] This study investigates the contribution of surgical trauma as compare with anaesthesia exposure alone to the development of this condition.
**Materials and methods:** Young wild type C57BL/6N mice were divided into control (CON) sevoflurane only (SEVO) and laparotomy (LAP) groups. Cognitive function was assessed by Y-maze analysis and locomotor activity by the Open Field test on postoperative day 14. Inflammatory cytokine mRNA expression from the liver, frontal cortex and hippocampus were assessed by q-PCR at 4h and 24h. Brain tissues were collected for Western-Blot analysis and immunoflurescent staining. Normalized band intensities were analyzed by One-Way ANOVA followed by Turkey's post hoc test.
**Results and discussion:** No differences were seen for locomotor activity but latency and error number were significantly increased in LAP compared with SEVO ($n=10$-11, $p<0.01$ and $p<0.05$ respectively) in Y-maze test. Hepatic mRNA levels of IL-1β, TNF-α, IL-8 and MCP-1 were significantly increased at 4h in LAP compared with SEVO and CON. IL-1β was elevated in the frontal cortex, as was IL-8 in the hippocampus at 4h in LAP ($n= 6$-8, $p<0.05$). Immunoflurescent positive intensity of GFAP labeled astrocyte was higher in LAP compared with SEVO at the DG region of hippocampus. There were also more activated microglia (IBA-1 labeled) in CA1 and DG regions of the hippocampus.
These results indicate that both peripheral and neuroinflammation and astrocytes and microglia activation are more pronounced following trauma compared with sevoflurane exposure alone and this corresponds to delayed cognitive impairment.
**Conclusion(s):** These data further support that POCD is a condition that is more related to surgical trauma than to anaesthesia exposure.
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## 01AP06-3

### Effects of general anesthesia with propofol versus desflurane on oxidative stress and inflammation in obese patients scheduled for bariatric surgery

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**Background and Goal of Study:** Obesity patients have high level systemic oxidative stress and inflammation*(1)*. Oxidative stress evaluation is based on measures of free radical mediated oxidative processes end products, such as malondialdehyde (MDA) and myeloperoxydase (MPO) and also pro-inflammatory cytokines, C reactive protein (CRP) and antioxidants*(2)*. Antioxidant therapy reduces oxidative stress.

Propofol has shown antioxidant proprieties as free radicals scavenger*(3)*. Propofol antioxidant effects have not yet been studied in obese patients.
This study evaluates the effect of propofol compared with desflurane on oxidative stress and inflammation markers in obese patients scheduled for bariatric laparoscopic surgery.
**Materials and methods:** After approval by the local Ethics Committee and signed informed consent, 40 patients were randomly allocated into 2 groups: group D (desflurane, n=20), general anesthesia induced with sufentanyl (0.2 mcg /kg) and thiopental (5 mg/kg); group P (propofol, n=20), general anesthesia induced with sufentanyl (0.2 mcg /kg) and propofol (2 mg/kg). Anesthesia was maintained in group D with desfurane and in group P with propofol. MDA, MPO, CRP, WBC and monocytes were analyzed. Venous blood samples were obtained at T0 (before induction ), T1 (60 min after incision), T2 (120 min after incision) and J1 (24 hours after surgery). Duration of anesthesia was recorded. Statistical analysis included: Bartlett's chi-squared test, Kolmogorov-Smirnov test and T-test .
Data are presented as mean ± standard deviation (SD). $p < 0.05$ was considered significant.
**Results and discussion:** Demographics did not differ between groups. BMI 42.4±4.8. CRP values were lower in group P at T1 (4.79±2.95 *vs* 9.83±8.39; *p=0.018*). Monocytes levels were lower in group D at T2 (4.75±1.75 *vs* 6.37±1.94; *p=0.011*). MDA, MPO, Vitamin E, β-carotene, 250H VD, IL-6 and WBC levels were not significantly different between groups ($p>0.05$). There was no significant difference in anesthesia length (113.50± 33.29 *vs* 120.95±25.09 min; *p= 0.4*).
**Conclusion(s):** The two anesthesia regimens do not seem to be protective against oxidative stress. Propofol seems to be beneficial on inflammation by reducing CRP values early after induction, but desflurane too, by reducing monocytes.
**References:**
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## 01AP06-4

### Effects of total intravenous and balanced anesthesia on cellular immune response in cervical cancer patients - preliminary results

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**Background and Goal of Study:** Surgery and other medical perioperative interventions induce a variable period of immunosuppression, with negative consequences on long-term outcome of cancer patients. The influence of anesthetic agents on the immune response is not fully elucidated.
We investigated the effects of general anesthesia (balanced inhalation anesthesia - BIA and total intravenous anesthesia target controlled infusion- TIVA-TCI) on T regulatory cells (Tregs) and NK cells in surgical patients with cervical cancer.
**Materials and methods:** Our prospective randomised trial (ongoing) included 26 consecutive patients with histologically confirmed cervical cancer referred for total hysterectomy, bilateral ovariectomy and lymphadenectomy. The study was first approved by the Institute and University Ethical Committee. Patients compliant with the proposed inclusion/exclusion criteria received TIVA-TCI (n=9) or BIA (n=17). At 30 minutes before surgery (t1), at end of surgery (t2), 12 hours post-surgery (t3) and 24 hours post-surgery (t4), Tregs, 6 Treg subsets (CD39+, CD45RA+, CD27+, CD39+45+, CD39+27+, CD27+45+), NK cells and 2 NK subsets (CD16+, CD16+low/-) were cyto-flowmetric assessed (Cytometer Beckman Coulter, Gallios). Kaluza software was used for data analysis.
**Results and discussion:** During first 24 hours after surgery, a progressive increase in Treg was noted only in BIA group (t1/t4=6,4/11,3%, p=0.004). Comparative analysis of Treg subsets in TIVA-TCI and BIA identified a significant difference in CD45RA+ Treg at 12 and 24 hours postoperative (t3- 5,8/2%, p=0,003, t4- 9,4/4,9%, p=0,004). NK cells dynamics shows an initial increase at the end of surgery (t2) in both types of anesthesia. Those values were maintained in BIA group but decreased to the the preoperative (t1) values in TIVA-TCI group, at 24 hours after surgery (t4).
**Conclusion(s):** Our preliminary data analysis indicates that the immunesuppressive effect induced by the increase of Treg can be ballanced by a concomitent increase in cytotoxic NK cells. In this circumstances we suggest that TIVA-TCI and BIA can both be used in cervical cancer patients submitted to total hysterectomy.
**Acknowledgements:** This work received financial support through the" Program of Excellence in doctoral and postdoctoral research in multidisciplinary chronic diseases ", contract no. HRD / 159 / 1.5 / S / 133377.

## 01AP06-5

### Gene expression of anaesthetic and analgesic drug targets in breast cancer tissue is associated with metastasis, but not local recurrence

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**Background:** Retrospective analyses indicate anaesthetic-analgesic technique during cancer surgery may affect metastasis[1].
This may involve receptor-mediated effects of anaesthetic/analgesic drugs on cancer cells[2].
While $\mu$-opioid receptor over-expression in lung tumours is associated with metastasis[3] other drug targets remain unexplored. No studies have linked tumour drug-receptor expression with long-term clinical outcomes.
Therefore our study aim was to evaluate the association between expression of anaesthetic-analgesic receptor targets within breast cancer tissue and metastasis.
**Methods:** We interrogated BreastMark, an online database of published gene expression data linking ~17,000 genes & clinical outcomes in breast cancer. It contains clinical & transcriptomic data derived from 26 datasets (4,738 patients). Using known structure-activity data, genes that encode the 23 most prominent targets of anaesthetics/opioids were screened. Gene expression data was dichotomized using recurrence & metastasis as end-points. Hazard ratios were calculated by Cox regression analysis. Enrichment for prognostic markers was determined by randomly choosing 23-member gene lists from all available genes & calculating how often >9 (9/23) significant prognostic markers were observed. This was repeated 10,000 times & an empirical p-value calculated.
**Results:** Of our 23 target genes 9 were associated with metastasis ($p<0.05$; Table 1) and 4 with recurrence. This list(9/23) was significant for metastasis as it was not observed when random genes were selected from the database (p=0.0494). High expression of agonist target genes for volatile anaesthetics & opioids ($GABA_A\gamma3$ subunit; $\mu$, $\delta$ opioid receptors), & low expression IV anaesthetic targets (NMDA3a subunit) were associated with metastasis but not recurrence.

| | Receptors | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Opiate Receptors | | NMDA receptors | | NA Channel Transporter | 5HT channel transporter | Glycine Receptors | GABAa subunits | |
| | OPRM1 μ | OPRD1 δ | GRIN3a | GRINa | SLC6A2 | SLC6A4 | GLRAB | GABAa γ3 | GABAa γ3 |
| P Value | 0.03 | 0.037 | 0.0004 | 0.018 | 0.006 | 0.034 | 8.371e-06 | 0.009709 | 0.0456 |
| Hazard Ratio | 1.203 (1.018-1.421) | 1.211 (1.011-1.4511) | 0.586 (0.435-0.789) | 1.353 (1.118-1.638) | 1.254 (1.067-1.473) | 0.8765 (0.776-0.9884) | 0.692 (0.588-0.8142) | 0.641 (0.457-0.9005 | 1.204 (1.003-1.444) |

*[Table 1: Hazard ratios (mean, 95% CI) for]*

**Conclusion(s):** Anaesthetic/analgesic receptors are enriched for prognostic targets in breast cancer, supporting the hypothesis that outcomes associated with perioperative anaesthetic/analgesic technique may reflect receptor-mediated drug effects.
**References:**
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3. Singleton PA et al. Br J Anaesth. 2014 113: i103-8

## 01AP06-6

### Genomic instability detected in anaesthesiologists exposed to trace concentrations of waste anaesthetic gases

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**Background and Goal of Study:** Occupational exposure to anaesthetic gases may result in adverse health effects. There is still controversy about genotoxic potential of anesthetic gases.
Thus, the aim of this study was to determine the trace concentrations of waste anaesthetic gases and to evaluate cytogenetic damage in anaesthesiologists.
**Materials and methods:** After the approval of the study from the Ethical Committee, the study was conducted in a Brazilian tertiary teaching hospital (Botucatu Medical School, Botucatu, SP). Buccal cells samples were collected from 57 physicians: 30 anaesthesiologists exposed to waste anesthetic gases (the halogenated isoflurane, sevoflurane and desflurane, and the gas nitrous oxide - $N_2O$) for at least 2 years, and 27 physicians (internal medicine) with no occupational exposure.
The groups were matched by age, sex and lifestyle. Chromosomal damage was evaluated by using the buccal micronucleus cytome assay (BMCyt), a minimally invasive method to detect genomic instability. Coded slides were stained, two thousand differentiated cells per subject were analysed, and micronucleus (MN) frequency was presented per thousand. The trace concentrations of waste anaesthetic gases were determined during inhalational anaesthesia in the breathing zone of anaesthesiologists, by using a portable infrared spectrophotometer, and the values were expressed in parts per million (ppm).
**Results and discussion:** There was no significant differences between groups regarding demographic data ($p > 0.05$). The exposed group showed higher frequencies of MN when compared to the controls ($p = 0.034$). The mean concentrations of waste anesthetic gases were 5.5 ± 4.4 ppm for isoflurane, 7.7 ± 8.7 ppm for sevoflurane, 16.4 6.0 ppm for desflurane and 150.3 ± 135.7 ppm for $N_2O$.
**Conclusion(s):** The current study showed that the occupational exposure to waste anesthetic gases is related with genomic instability assessed by BMCyt in anaesthesiologists exposed to the trace concentrations found in the current study, suggesting that these professionals can be considered in potential risk for harmful genetic effects.
**Acknowledgements:** This study was supported by the grants #2013/05084-8, São Paulo Research Foundation (FAPESP) and #471604/2013-5, The National Council for Scientific and Technological Development (CNPq). FAPESP and CNPq are Brazilian government agencies dedicated to promoting scientific research.

## 01AP06-8

### Comparison of desflurane anaesthesia associated or not with nitrous oxide in oxidative DNA damage in patients undergoing minimally invasive surgery

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**Background and Goal of Study:** Desflurane is one of the newest halogenated anaesthetics and has recently been introduced in clinical practice. Little is known about the genotoxic effect of desflurane, and whether concomitant use of nitrous oxide ($N_2O$) can aggravate this effect on genetic material.
Thus, the aim of this study was to evaluate oxidative DNA damage of anaesthesia maintained with desflurane, associated or not to $N_2O$, in patients.
**Materials and methods:** After approval from the local Ethical Committee, 30 ASA physical status I patients, non-smoking adults, of both sexes, who underwent minimally invasive surgery lasting at least 90 minutes were included in the study. Patients were randomly allocated into two groups of 15 to receive desflurane anaesthesia (1 MAC - 6%, 40% $O_2$ and 60% air) or desflurane anaesthesia associated with $N_2O$ at 60% (40% $O_2$). Blood samples were collected at baseline (before anaesthesia induction), 90 min after the beginning of anaesthesia and one day after surgery.
The alkaline comet assay was performed in lymphocytes by using the enzyme endonuclease III to increase the sensitivity of the assay to detect oxidized bases.
**Results and discussion:** There were no significant differences between groups regarding demographic data (age, gender or body mass index, $P > 0.05$). The results showed no significant differences in oxidative DNA damage among the time points in the same group or between groups ($P > 0.05$).
**Conclusion(s):** The findings indicate that neither desflurane anaesthesia nor desflurane anaesthesia associated with $N_2O$ induces oxidative DNA damage when evaluated in ASA physical status I patients undergoing minimally invasive surgery. Both types of anaesthesia seems to be safe regarding the genome in these type of patients.
**Acknowledgements:** This study was supported by FAPESP (grant #2013/16842-0).

## 01AP06-9

### Evaluation of occupational exposure to waste anaesthetic gases in the inflammatory and oxidative stress biomarkers in medical residents

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**Background and Goal of Study:** Occupational exposure to anaesthetics is thought to exert adverse effects in operating room personnel. It is known that inflammation and oxidative stress are linked processes; however, it lacks in the literature reports about the effects of occupational exposure to anaesthetics in the inflammation-oxidative stress pathways.
Thus, this study aimed to evaluate inflammatory cytokines and oxidative stress in medical residents occupationally exposed to waste anaesthetic gases.
**Materials and methods:** The Ethical Committee of the Institution approved the study, which included 30 subjects who were allocated into two groups of 15: the exposed group, consisting of medical residents from anaesthesiology and surgery areas exposed to waste anaesthetic gases (isoflurane, sevoflurane and nitrous oxide) for a three year-period, and a control group composed of medical personnel not exposed to waste anaesthetic gases (internal medicine). Blood samples were collected at the same time for both groups, and plasma aliquots were used. Inflammatory interleukins (IL-6, IL-8 and IL-17) were determined by flow cytometry; oxidative stress was determined by evaluating two markers of lipid peroxidation: malondialdehyde (MDA) by high-performance liquid chromatography (HPLC) and 4-hydroxynonenal (4-HNE) by immunoassay (ELISA), and also by the antioxidative status using the total antioxidant performance (TAP) detected by fluorometry.
**Results and discussion:** There were no significant differences between groups in relation to demographic data. Results showed a significant increase in IL-8 and IL-17A in the exposed group compared with the control group ($P < 0.05$). Interestingly, IL-8 and IL-17A are potent proinflammatory cytokines that have been associated with pathogenesis of a wide range of inflammatory diseases, including the respiratory tract, such as chronic bronchitis. On the other hand, no significant differences between groups were detected regarding oxidative stress markers ($P > 0.05$).
Thus, despite the observed changes in the inflammatory cytokines, occupational exposure to anaesthetics does not seem to induce oxidative stress.
**Conclusion(s):** The findings suggest an inflammatory response without alterations in the antioxidant status in medical residents exposed for three years to waste anaesthetic gases.
**Acknowledgements:** This study was supported by FAPESP (grant #2013/21130-0).

## 01AP06-10

### Immediate postoperative albumin level is associated with acute kidney injury following total knee replacement arthroplasty: a retrospective analysis of 1,309 consecutive patients based on KDIGO criteria

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**Background and Goal of Study:** It has been shown that postoperative acute kidney injury (AKI) is associated with morbidity and mortality. Hypoalbuminemia has been reported to be an independent risk factor for AKI. However, little is known about the relationship between albumin level and the incidence of AKI in patients with total knee replacement arthroplasty (TKRA). The aim of our study was to assess incidence and risk factors of AKI and to evaluate the relationship between albumin level and AKI following TKRA.
**Materials and methods:** The medical records of patients who underwent TKRA between January 2008 and December 2014 were reviewed. The patients were divided into two groups by the lowest serum albumin level within the postoperative day 2(POD2_alb). Multivariate logistic regression analysis was used to assess risk factors of AKI. The comparison of incidence of AKI, hospital stay, and overall mortality between the 2 groups was performed using propensity-score analysis.
**Results and discussion:** Of 1,309 patients, fifty seven patients (4.4%) developed AKI based on KDIGO criteria. Associated factors with AKI include diabetes [odds ratio(OR) 2.98; 95% confidence interval(CI) 1.57-5.65; $p<0.001$, uric acid (OR 1.49; 95% CI 1.23-1.81; $p<0.001$), preoperative beta blocker use (OR 0.38; 95% CI 0.21-0.68; $p=0.001$), and POD2_alb <3.0 mg/dL (OR 1.88; 95% CI 1.01-3.31; $p=0.029$). After propensity score analysis, POD2_alb <3.0 mg/dL was associated with AKI occurrence (OR 1.82; 95% CI 1.03-3.24, $p=0.041$) and longer hospital stay ($p=0.001$). Therefore, it is thought that early detection and treatment of immediate postoperative hypoalbunemia may improve the outcome of patients after TKRA.
**Conclusion(s):** In this study, AKI occurred in 4.6% of patients with TKRA. POD2_alb <3.0mg/dL was an independent risk factor of AKI and lengthened hospital stay in patients with TKRA.
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## 01AP06-11

### Intravenous dexmedetomidine supports bacterial growth

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**Background and Goal of Study:** Intravenous infusions may be contaminated during preparation or during administration. The contamination rate of intravenous drugs may be as high as 18% during preparation.(1)
These medications may be the source of serious infection if the contaminating bacterium can multiply in the solution(2).
Dexmedetomidine is frequently used as an infusion in intensive care units for sedation. Its administration may improve the outcome of septic patients(3).
In this study we examined bacterial growth in dexmedetomidine.
**Materials and methods:** The growth of *Staphylococcus aureus* (American Type Culture Collection [ATCC] 25923), *Escherichia coli* (ATCC 25922), and *Pseudomonas aeruginosa* (ATCC 27853) in dexmedetomidine (Orion) was investigated. Dexmedetomidine was diluted in saline according to the manufacturer's recommendations (4 $\mu$g/mL). One mL diluted dexmedetomidine was inoculated with the above strains and kept at room temperature. The initial bacterial inoculums were 1,5 x $10^4$ colony forming units (cfu) $mL^{-1}$. At 0, 1, 2, 3, 8, and 24 hours 10$\mu$L was plated on Mueller - Hinton (MH) agar. Having incubated for 24 hours at 37°C the cfu was counted. Three parallels were performed. Saline 0.9%, MH broth controls and dexmedetomidine sterility check was also applied. Two-way analysis of variance served as the statistical method.
**Results and discussion:** The cfu of all examined strains were unchanged during the first 8 hours. By the end of the experiment (24 h) the bacterial count of P. aeruginosa and E. coli increased significantly, while the cfu of S. aureus remained unchanged in dexmedetomidine. The bacterial growth of P. aeruginosa and E. coli showed the same pattern in dexmedetomidine and in saline. Our results suggest that bacteria survive and after several hours multiply in dexmedetomidine infusion if contaminated. This fact draws the attention for the need of the most careful preparation of dexmedetomidine infusion and the same precautions should be applied as with propofol.
**Conclusion(s):** Most of the medications we use in anaesthesia and intensive care inhibit bacterial growth (4). Dexmedetomidine belongs to the few drugs that need extra care when preparing and administering as they support bacterial growth if contaminated.
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## 01AP06-12

### Remifentanil and hydrogen peroxide-induced oxidative stress on human keratinocytes

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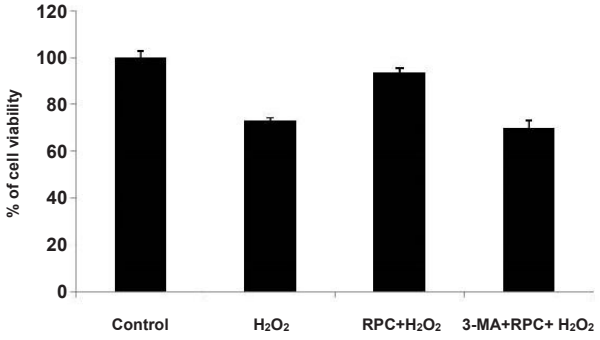
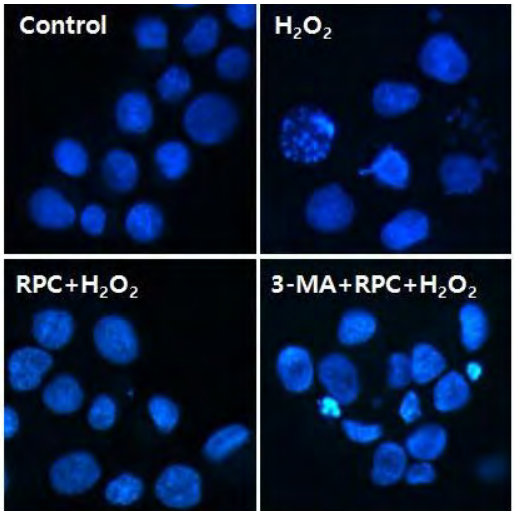
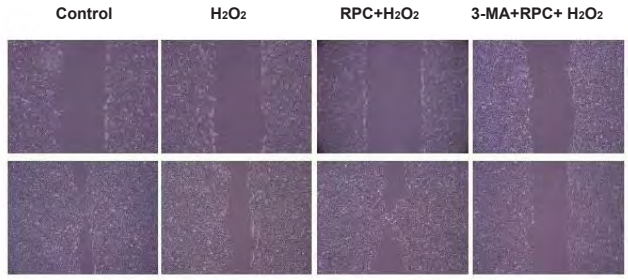
**Background and Goal of Study:** Many patients suffer from wound healing problems after surgery. During wound healing process, reactive oxygen species (ROS) are produced and overfull ROS are detrimental to wound repair because of their high reactivity. Remifentanil decrease the production of ROS and inflammatory response.
Therefore, we investigated the effects of remifentanil on human keratinocytes (HaCaT cell) during $H_2O_2$-induced oxidative stress and whether this effect has connection with autophagy.
**Materials and methods:** The groups were randomly divided into the following groups: Control; cells were incubated in normoxia without remifentanil, $H_2O_2$; cells were exposed to 2 h $H_2O_2$ (300 $\mu$M), remifentanil pretreatment (RPC)+$H_2O_2$; cells pretreated with remifentanil (1 ng/mL) 2 h were exposed to $H_2O_2$, 3-Methyladenine (MA)+RPC+$H_2O_2$; cells pretreated with 3-MA (1 mM) 1h and remifentanil. Cell viability was determined with MTT reduction. Apoptosis was determined by Hoechst staining.
**Results and discussion:** Cell viability significantly decreased in $H_2O_2$ group and improved by RPC. RPC effectively decreased $H_2O_2$-induced apoptosis in HaCaT cell. Remifentanil restore cell proliferation and migration injuried by $H_2O_2$. However, 3-MA inhibited the protective effect of remifentanil at cell apoptosis.




*[Fig. 1]*




*[Fig. 2]*




*[Fig. 3]*

**Conclusion(s):** This study suggests that remifentanil pretreatment has protective effect on $H_2O_2$-induced cell apoptosis in HaCaT cell. Also, our results show that autophagy has a potential role in protection of apoptosis in response to oxidative stress.

## 01AP07-1

### Coagulation profile in obese parturients undergoing elective cesarean delivery with post-partum hemorrhage evaluated by thrombelastography

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**Background and Goal of Study:** Abnormalities in coagulation are important risk factors in obese parturients together with vascular thrombosis. Several studies have shown that these patients may have changes in plasma coagulation factors and aggregation of platelets. The aim of our study was to review obstetric changes in coagulation profile in obese parturients undergoing elective cesarean delivery with post-partum hemorrhage evaluated by thrombelastography (TEG). (1)
**Materials and methods:** A systematic multicentric review of our recorded data was analyzed. We identified 46 obese patients with BMI ≥ 30. Comorbidities such as diabetes and hypertension and neonatal outcomes were also recorded. Blood samples were collected and analyzed with post partum standard coagulation tests (PT, aPTT, fibrinogen and platelets) and by a TEG (maximal amplitude MA-K, the maximum rate of thrombus generation MRTGG-K/ MRTGG-FF and functional fibrinogen level FLEV) so all data were compared. All patients received spinal anesthesia with levobupivacaine 0.5% and fentanyl 20 mcg. Data were recorded as mean (SD), median [IQR], $P<0.05$ was considered as statistically significant.
**Results and discussion:** The study demonstrated that only the functional fibrinogen level FLEV evaluated with TEG was correlated with standard fibrinogen concentration ($p<0.001$; CI 95%: 0.5-0) while for all other parameters the area under curve of TEG parameters (MRTGG-K vs MA-K and FLEV vs MRTGG-FF) was not statistically different ($p=0.1$). Comorbidities were observed in 6 patients but were not statistically and clinically significant. Neonatal outcomes were without significant complications (Table 1)
**Conclusions:** Post-partum hemorrhage is an important complication in obese patients. Thrombelastography parameters provide an early detection of coagulation disorders and is well correlated with standard fibrinogen concentration. The earlier execution of the TEG allows to quickly adopt therapeutic measures and achieve the best neonatal outcome.
**Reference:** Sharma S et al. Use of thromboelastography to assess the combined role of pregnancy and obesity on coagulation: a prospective study. Int J Obstet Anest 2013;22:113-8.

| Test Type | Area Under Curve | Value | Sensibility | Specificity | Positive predictive value | Negative predictive value |
|---|---|---|---|---|---|---|
| FLEV | 0,938 | 1.4 | 72 (51-88) | 95 (89-98) | 83 | 95 |
| MA-K | 0,946 | 62.3 | 87 (72-92) | 89 (81-93) | 80 | 94 |
| MRTGG-K | 0,951 | 5.6 | 89 (75-93) | 94 (86-97) | 91 | 96 |
| MRTG-FF | 0,907 | 1.3 | 68 (48-82) | 91 (85-95) | 65 | 93 |

| | BMI kg/m² (30-50) |
|---|---|
| Apgar 1 min. | 8 (7 - 9) |
| Apgar 5 min. | 9 (8 - 9) |
| Umbilical cord arterial pH | 7.28 (7.23 - 7.32) |

*[Table 1. TEG parameters and neonatal outcomes]*

## 01AP07-2

### Colloids vs. crystalloid for surgery with risk of bleeding - effects on coagulation competence, haemorrhage, and outcome - a randomized controlled trial

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**Background and Goal of Study:** Colloids and crystalloids support the circulation and maintain tissue perfusion in surgical, traumatic and critical care patients (1,2). However, fluid substitution in itself may influence the blood loss. Here influence of colloids and lactated Ringer's solution (LR) is evaluated during cystectomy in regard to coagulation competence, haemorrhage and outcome.
**Materials and methods:** One hundred and nine patients were randomized to receive colloids vs. LR for cystectomy. 17 patients received hydroxyethyl starch (HES 130/0.4), 19 patients Dextran, 17 patients human albumin, and 54 patients LR with blinded evaluation of the blood loss while coagulation competence was evaluated by thrombelastography (TEG) and plasma coagulation analyses and outcome variables were noted.
**Results and discussion:** The perioperative blood loss was 2.3 L in the Dextran and HES groups compared to 1.7 L in the LR and albumin groups, equating the lowest need for transfusion in the LR group ($P<0.03$). The lowest TEG "angle" and "MA" were observed in the dextran group, whereas the changes were almost equal in the LR and albumin group. Human albumin also reduced TEG angle and MA, however, to a lesser degree than Dextran and HES. More patients in the LR group having a positive fluid balance exceeding 2.0 L: 27/54 (50%) compared to 1/17 (6%) in HES, 4/19 (21%) in Dextran, and 1/19 (5%) in the albumin groups ($P<0.001$). Leak requiring re-operation was associated with a > 2.0 L postoperative positive fluid balance ($P<0.004$).
**Conclusion:** This randomized controlled trial compared administration of LR with non-protein colloids during cystectomy and favors crystalloid treatment with regard to coagulation competence, blood loss and transfusion requirement, while the impact of albumin and LR on coagulation is almost identical. However postoperative positive fluid balance > 2.0 L was associated with risk of re-operation.
**References:**
1. Perel P, Roberts I, Ker K. Colloids versus crystalloids for fluid resuscitation in critically ill patients. *Cochrane Database Syst Rev* 2013;2:CD000567.
2. Cortes DO, Barros TG, Njimi H, Vincent J-L.Crystalloids versus colloids: Exploring differences in fluid requirement by systematic review and meta-regression. Anesth Analg 2015;120:389-4.

## 01AP07-3

### Effects of balanced hydroxyethyl starch 6% (130/0.4) and albumin 5% on coagulation: a prospective randomized trial using thrombelastometry and platelet function tests

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**Background and Goal of Study:** The effects of artificial colloids on coagulation are widely analysed in different in vitro and in vivo studies. The negative effects of colloids results not only from haemodilution but also from direct impairment of coagulation factors. Albumin, like every other intravenous fluid, can lead to haemodilution and decrease fibrinogen levels. The aim of our trial was to evaluate the effect of a modern artificial colloid (balanced hydroxyethyl starch (HES) 6%/130/0.4) and albumin 5% on coagulation.
**Materials and methods:** The study was planned as a monocentric, open-label, randomized, comparative trial with two parallel patient groups, comparing human albumin 5% versus balanced HES 6% 130/0.4. Patients between 18 and 85 years undergoing surgical cystectomy were included. Exclusion criteria were i.a. bleeding tendency or platelet dysfunction. Global coagulation parameters (prothrombin time (PT), partial thromboplastin time (PTT), fibrinogen level (Clauss method)), rotational thrombelastometry (ROTEM©), PFA-100 and the Multiplate analyzer were used to evaluate the effects on coagulation. Wilcoxon's test was used to detect intragroup changes and Mann-Whitney-U test for differences between groups.
**Results and discussion:** 56 patients were randomized to receive either human albumin 5% (n = 28) or balanced HES 6%/130/0.4 (n = 28). Patients characteristics (all values given as mean and standard variation): ASA classification score 2.57 (±0.66); age 67.4 years (±9.67 years); body mass index 26.72 (±4.7); intraoperative crystalloids amount 2224ml (±744.9ml); intraoperative colloids amount 1309ml (±538ml); calculated blood loss 1398ml (±777ml); transfusion rate 23.3%. In both groups PTT increased significantly ($p=0.004$) whereas PT and fibrinogen levels decreased ($p<0.001$) without differences between the groups. ROTEM© parameters A10, A20, MCF (maximum clot formation) and MCE (maximum clot elasticity) were significantly more compromised in the HES than in the albumin group (INTEM and FIBTEM) ($p\leq0.005$). No intergroup differences were detected by Multiplate or PFA-100.
**Conclusions:** Both colloids, balanced HES 6% and albumin 5%, compromise coagulation factors, presumably due to dilutive effects. Thrombelastometric values, measured by FIBTEM and INTEM, were significantly more impaired by HES whereas the platelet function, measured by Multiplate analyzer and PFA-100, was not different between both groups.

## 01AP07-4

### Mean platelet volume predicts increased blood transfusion requirements in adult patients undergoing liver transplantation

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**Background:** Despite advances in surgical technique and anaesthetic management, perioperative bleeding remains one of the main causes of increased mortality and morbidity in adult patients (pts) undergoing liver transplantation (LT). Few studies have suggested that greater mean platelet volume (MPV) can predispose to thrombotic events. However so far there were no studies to evaluate the predictive value of MPV on perioperative blood loss in pts undergoing solid organ transplantation.
**Objectives:** We sought to determine the prognostic value of MPV for blood transfusion requirements in adult patients undergoing LT.
**Material and methods:** We have prospectively enrolled 78 adult pts undergoing cadaveric LT at Medical University of Warsaw. Pts were recruited from August 2012 until March 2014. Written informed consent was obtained from all pts. Blood samples for MPV measurement were obtained at admission before LT. The primary end point was the number of units of red blood cells (RBC), fresh frozen plasma (FFP), platelet concentrates (PLT) and cryoprecipitate transfused during LT.
**Results:** The median value of MPV in the study group was 10,9 fl (range 7,2-13,1 fl). There was no correlation between MPV and platelet count. Multivariate linear regression analysis showed that MPV was independently associated with the number of RBC transused intraoperatively ($\beta=-0,234$; $p=0,44$). Similar analysis for intraoperative FFP transfusion showed a trend towards increased FFP requirements with decreased MPV ($\beta=-0,185$; $p=0,086$). MPV did not predict intraoperative PLT transfusion requirements, however it was a significant predictor for cryoprecipitate transfusion during LT ($\beta=-0,236$; $p=0,033$).
**Conclusions:** This is the first study to demonstrate that mean platelet volume is significant and independent predictor of increased blood transfusion requirements during LT in adult pts. Except for its prognostic value it may also carry further therapeutic implications. However the mechanistic link of this observation needs to be further elucidated.

## 01AP07-5

### Dissemination and clinical impact of the ESA guidelines for the management of severe perioperative bleeding

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**Background and Goal of Study:** The European Society of Anaesthesiology (ESA) published Guidelines for the management of severe perioperative bleeding in 2013. The purpose of these ESA Guidelines was to provide an overview of current knowledge on perioperative bleeding management. This survey was conducted to evaluate the dissemination of the ESA Guidelines among medical personnel two years after publication, and to assess current practice in bleeding management.
**Materials and methods:** We conducted an online survey among ESA members. The ESA endorsed the survey after approval by its Scientific, Research, and Media Committee. We assessed demographic data, dissemination status of the ESA Guidelines, preoperative assessment of bleeding risk, preoperative assessment and treatment of anaemia, clinical use of algorithms, and intraoperative transfusion practices. Distributions were analysed using a $chi^2$ test.
**Results and discussion:** We received 706 fully completed surveys (8% response rate) from physicians in 57 countries. Ninety-nine percent of respondents were anaesthesiologists or intensive care physicians. Among physicians participating in the survey, 539 (76%) stated they were aware of the ESA Guidelines. Regarding preoperative assessment of bleeding risk, only 48% of physicians mostly or always obtain a standardised bleeding history prior to surgery. When bleeding history is negative, 55% of physicians routinely order preoperative coagulation testing. Furthermore, the results reveal deficits in the management of preoperative anaemia, with only 24% of physicians mostly or always assessing patients at risk of bleeding during surgery for anaemia 4-8 weeks before elective surgery. When anaemia is diagnosed, only 38% of physicians routinely investigate its cause. Algorithms to guide perioperative bleeding management are used by 62% of physicians, and body temperature and plasma pH are a key part of the management process. Finally, physicians working in university settings have access to point-of-care coagulation monitoring devices more commonly than those working at community hospitals or in private practice (50% vs. 20%, respectively, $p<0.001$).
**Conclusions:** The ESA Guidelines are broadly disseminated two years after their publication, but adherence to recommendations and suggestions varies greatly. The results obtained in this study should help to improve the adoption of the ESA Guidelines and potentially influence the design of future recommendations.

## 01AP07-6

### Post-bariatric surgery anemia: hemoglobin and hematocrit response to intravenous ferric carboxymaltose before plastic surgery

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**Background and Goal of Study:** Anemia is common among post-bariatric surgery patients. Besides impairing nutrient absorption, bariatric surgery can induce chronic gastro-intestinal blood loss and iron-loosing enteropathy, leading to iron deficiency and anemia. Preoperative anemia is an independent risk factor for red blood cell transfusion (RBC) and increase postoperative morbi-mortality. Intravenous iron therapy has been proposed as a fast and efficient strategy to increase hemoglobin and minimize exposure to RBC transfusions.
The aim of this study was to evaluate hemoglobin and hematocrit response to intravenous ferric carboxymaltose in post-bariatric patients proposed for abdominoplasty and mammoplasty.
**Materials and methods:** We retrospectively analyzed records from patients with history of gastric bypass surgery and proposed for intravenous iron treatment before abdominoplasty or mammoplasty, between 2013 and 2015. We compared patient's hemoglobin and hematocrit values before and after treatment, using t-student statistic model of SPSS 17.
**Results and discussion:** A total of 47 patients (n=47) were submitted to a single dose of ferric carboxymaltose (1000mg) preoperatively. All patients were females (n=47), 45 were classified as ASA II and 2 as ASA III. Mean age was 40,2 ± 7,79 years and mean weight 69 ±12,2kg. Patients underwent gastric bypass surgery between 2006 and 2015. Mean preoperative hemoglobin and hematocrit values were 9,72 ±0,75g/dL and 31,2 ±1,95% respectively. No adverse reactions were documented with ferric carboxymaltose administration and control hemogram were obtained 3 weeks after therapy. Pos-treatment mean hemoglobin and hematocrit values was 11.5 ±0,28g/dL (p=0.0138) and 36.2 ±1,97% (p=0,0132) respectively, which represented an average hemoglobin and hematocrit increase of 1,8 ±0,97g/dL and 5 ±2,87%, respectively. Surgeries were scheduled within 1 and 2 weeks after control hemogram. All patients were discharged 3 days after surgery and none needed to be transfused in the postoperative setting.
**Conclusion(s):** A single administration of ferric carboxymaltose (1000 mg) seems to be a safe and efficient strategy to significantly improve preoperative hemoglobin and hematocrit values in post-bariatric surgery patients proposed for elective surgery. These results highlight the relevance of a good blood management practice.

## 01AP07-7

### Increased platelet aggregation (over)compensates thrombocytopenia in patients undergoing orthotopic liver transplantation

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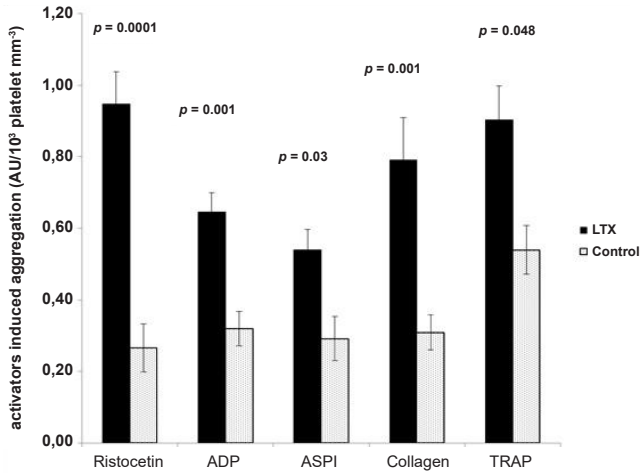
**Background and Goal of Study:** Liver transplantation patients often present with thrombocytopenia, increased von Willebrand factor, and decreased ADAMTS13 concentrations (1-3) but the net effect on primary haemostasis is unknown. We hypothesized that platelet aggregation is increased in liver transplantation.
**Materials and methods:** Following ethics committee approval, platelet aggregation was determined (impedance aggregometry; Multiplate®) using the activators ristocetin, ADP, arachidonic acid, collagen, and thrombin receptor activating peptide (TRAP) in 37 liver transplantation patients (at 4 time points) and in 10 controls (patients scheduled for minor surgery without liver disease or previous liver surgery). Platelet count was assessed by using a Coulter counter. The correlation of platelet aggregation and count was also evaluated. Statistics: Student t-test for independent samples.
**Results and discussion:** In vitro (n=8), there is a strict correlation between platelet count and aggregation (r=0.91 ± 0.07, p= 0.0001). In liver transplant recipients, platelet count was decreased compared to controls (114 x $10^3$ $mm^{-3}$ vs. 225 x $10^3$ $mm^{-3}$, p=0.0001), but ristocetin induced aggregation was markedly increased (101.8 AU vs. 56.9, p=0.02). Correction of the assay for platelet count revealed a 3-fold increase in ristocetin-induced aggregation (0.95 AU/$10^3$ platelet $mm^{-3}$ vs. 0.27; p=0.0001). ADP-, arachidonic acid-, collagen-, and TRAP induced platelet aggregation did not differ from the respective control values without correction for platelet count. After correction, however, evoked platelet aggregation was markedly increased with all these activators (by 67-156 %, p<0.05). Platelet aggregation normalized at the end of surgery.




*[Evoked aggregation corrected for platelet count]*

**Conclusion:** Platelet aggregation is markedly increased in liver transplantation recipients but normalizes towards the end of surgery. While increased platelet aggregation in liver recipients can potentially compensate for thrombocytopenia, it might also favour thrombotic complication.
**References:**
1. Uemura M. Thromb Haemost. 2008, 99:1019,
2. Pereboom IT. Anesth Analg. 2009,108:1083,
3. Tsai HM. ASAIO J. 2012 58:163.

## 01AP07-8

### Implications of haemotherapy in the outcome after radical prostatectomies

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**Background and Goal of Study:** Reports about effect of perioperative blood transfusion (PBT) on prostate cancer recurrence and mortality are contradictory.1
The aim of this study is to analyze the implications of the haemotherapy in the outcome of patients undergoing radical prostatectomy (RP).
**Materials and methods:** Retrospective analysis of patients undergoing RP in a central hospital during 2014. The variables analyzed were: the need for transfusion during hospitalization and its implications in variation of hemoglobin and creatinine between admission and discharge, in the days of hospitalization, biochemical recurrence and mortality. Statistical analysis are performed using SPSS Statistics® 23, percentages were used for categorical variables; average with standard deviation (SD) or median with quartiles for nominal variables, depending on the normality tests.
The Kruskal-Wallis, Mann-Whitney U, Qui-squared tests and Spearman's correlation were performed according to the characteristics of the variable and considered statistically significant
a p-value <0.05.
**Results and discussion:** In total 114 RP were performed. Patients had a mean age of 64.7 years (SD 6.7).
Transfusion was performed in 21,9% of patients with a median of 2 units of erythrocytes concentrate. The target of hemoglobin (median) for transfusion was 8.5 g/dL in the immediate perioperative and 7.83g/dL in the infirmary. Human plasma units were administered in 6 patients, with a median of 2.5 units. Transfusion of blood components was statistically significantly related with days of hospitalization (p<0.001) and the biochemical recurrence (value

of prostate-specific antigen postoperatively p=0.047). However, transfusion didn't correlate significantly with change of creatinine (p=0.924) or hemoglobin (p=0.168) and mortality (p=0.356).
Several mechanisms exist to explain possible adverse effects of PBT on disease recurrence and survival, however data have yet to clearly demonstrate a relationship between PBT and adverse cancer outcomes. PBT is clearly associated with significant blood loss during surgery and might simply be a marker for more extensive or aggressive disease which is itself an independent predictor of worse oncological outcome.1
**Conclusion(s):** Avoidance of transfusion is not always possible and a restrictive transfusion criteria should be used whenever possible to maximize benefit and ameliorate possible risks.1
**Reference:**
1. Clin Genitourin Cancer 2015;13(3):e173-81

## 01AP07-9

### Impedance Aggregometry platelet aggregation is dependent on platelet count

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**Background and Goal of Study:** Impedance aggregometry (Multiplate®) has proved its usefulness in the prediction of thrombotic complications after coronary and cerebrovascular stent interventions (1-3). However, although the evidence is poor, it is often taken for granted, that the platelet count when within the physiological range does not affect platelet aggregation. We hypothesized that:
1) impedance aggregometric values and platelet count are highly correlated and
2) the aggregation/platelet count ratio expresses platelet function independent of platelet count.
**Materials and methods:** Following ethics committee approval, platelet rich plasma, derived by centrifugation with 110 g for 5 minutes at 24°C of blood samples from 8 different patients, was diluted with platelet poor plasma creating different concentrations of platelets. Thereafter, platelet count was measured and samples were subjected to impedance aggregometry using thrombin receptor-activating peptide (TRAP) for platelet activation. Platelet poor plasma was obtained by centrifugation at 1800 g for 10 minutes at 24°C. Aggregation and platelet count were correlated and aggregation was compared in undiluted and 2-fold diluted samples. Statistics: Pearson correlation and Student`s t-test for paired sample.
**Results and discussion:** In every single experiment, platelet count and impedance aggregometry highly correlated (mean correlation coefficient: 0.91 ± 0.07), and, in all measurements (n=32), the correlation between evoked platelet aggregation and platelet count was (r= 0.78, p= 0.0001), with an aggregation unit/platelet count correlation of 0.16 (p= 0.3). Moreover, there was a significant difference when comparing platelet aggregation in undiluted and 2-folds diluted samples (n=19, 94.3 AU vs 41.8, p= 0.0001). In contrast, there was no difference in the aggregation/count ratio between undiluted and 2-folds diluted samples (n=19, 0.33 AU/$10^3$ platelet $mm^{-3}$ vs 0.27, p= 0.13).
**Conclusions:** In individuals, there is a strict proportionality between platelet count and aggregation, and, therefore, this variable might be indicative of the number of platelets aggregating when evoked by a particular activator. Conversely, normalization of aggregometry findings can be achieved by simply dividing aggregation by platelet count.
**References:**
1. Siller-Matula, J Thromb Haemost. Feb;8(2): 351-9,
2. Straub, N. Thromb Haemost. Oct 24;111(2).
3. Müller-Schunk S. Am J Neurorad. 2008;16:786-791. doi: 10.3174/ajnr.A0917

## 01AP07-10

### Influence of HES 130/0.4 on perioperative hemostasis in hepatectomy assessed by rotational thromboelastometry (ROTEM®): a randomized controlled trial

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**Background and Goal of Study:** Hepatectomies - mostly performed for malignant disease - are still associated with significant intraoperative blood loss. Thus optimal fluid management for minimizing the use of blood products is of major interest. (1) Colloids in goal-directed fluid management seem to improve outcome in abdominal surgery but their use in the perioperative setting remains questionable, considering their effects on hemostasis. This prospective, randomized study was designed to assess the effect of hydroxyethylstarch 130/0.4 (HES) compared to Ringer's lactate (RL) on hemostasis as measured by rotational thromboelastometry (ROTEM®) in patients undergoing hepatectomy.
**Materials and methods:** Fifty patients scheduled for hepatectomy were enrolled into this study. All patients received a baseline fluid administration with RL 7 ml/kg/h. Intraoperative changes in corrected flow time and stroke volume, as measured by transesophageal Doppler indicating hypovolemia were treated with 250 ml of RL (n=25) or 250 ml of HES (n=25). ROTEM®, as well as conventional coagulation tests and blood count were measured preoperatively, after every 500 ml of RL or HES, at the end of surgery, and 24 hours postoperatively. Statistical analysis was performed using a Mann-Whitney U-test. Data is expressed in median and range.
**Results and discussion:** In the RL group FIBTEM-MCF remained within the normal range at 18 mm (9-37) and plasma fibrinogen reached a minimum of 253 mg/dl (176-494). In the HES group a minimum of 13 mm (4-30; p<0.01) and 240 mg/dl (141-374; p=0.12), respectively was observed. Other ROTEM® results and conventional coagulation tests remained within the normal range during the study period. No significant difference was found in the overall amount of fluids substituted. The RL group received a median of 2950 ml RL (1190-6200) while the HES group received 1660 ml RL (520-2901; p<0.01) and 1000 ml HES (250-2250). Use of HES resulted in a tendency to higher blood loss of 600 ml (100-1300) vs. 400 ml (100-1100; p=0.11).
**Conclusions:** We could demonstrate that the use of HES impairs FIBTEM-MCF during hepatectomy. However, these results returned to normal after 24 h without any intervention required. Administration of HES in patients undergoing hepatectomy may impair hemostasis and increase blood loss.
**Reference:**
1. Kamiyama T, et al. Perioperative management of hepatic resection toward zero mortality and morbidity. J Am Coll Surg. 2010;211:443-9.

## 01AP07-11

### Microsurgical breast reconstruction: impact of colloids use in perioperative bleeding

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**Background and Goal of Study:** Microsurgical breast reconstruction has become a key issue on cancer treatment. Final outcomes are related with perioperative management, and in this context fluid therapy seems to be crucial. Besides ideal fluid remains unclear use of colloids is common in this kind of surgery. This study aims to analyse colloid effects on bleeding or reoperation outcomes.
**Materials and methods:** We analysed retrospectively all autologous free flap breast reconstructions performed at the Hospital Universitario 12 de Octubre during 11 months regarding volume and type of colloids (VTC) delivered at the intraoperative (IO) period and at postanaesthetic care unit (PACU). Outcomes analysed were significant bleeding (SB) plus reoperation (REOP) and need of blood transfusion (BT). We have also compared the IO volume of colloids with changes on coagulation tests between preoperative consultation and PACU admission.
**Results and discussion:** 59 patients were included.56 patients received colloids.95 % used hydroxiethyl starch colloids (HES 130/0,4) and 5 % gelatins. Estimated bleeding volume during surgery and PACU stay were 781 ml and 192 ml respectively. Mean colloid administered volume was 912 ml at IO and 358 ml during PACU. Incidence of postoperative SB was 10,1% with a REOP

need of 8,4%. No significant differences were found regarding VTC administered throughout IO period or PACU stay (p>0.5). BT was required in 10 cases (17,85%); 4 of them needing IO transfusion.No association were found among VTC and BT (p0.273). We also compare pre-surgical coagulation tests with those made at PACU admission. Lab parameters analysed were prothrombin activity (PA), platelet count (PT) and normalized international ratio (INR). Volume of IO colloids were statistically correlated with a change in all values: a mean fall of 23% of PA (p0.0002), an increase of 0,1 points of INR (p0.0153) and a decrease of PT count of 60363 x $mm^3$ (p<0.0001) were seen. However these alterations were not related to SB or REOP (p>0.5).
**Conclusion(s):** Our results suggest that there is not a statistically relevant correlation between volume of colloids and bleeding or reoperation outcomes. Our rates regarding SB and REOP are higher compared to previous published studies. Despite in our cohort perioperative colloids do not exceed recommended dose (<30ml/kg) its administration induce remarkable lab coagulation abnormalities but with negligible impact in primary outcomes (SB and REOP).

## 01AP07-12

### A forgotten point of view in the treatment of massive bleeding? Economic study on hemotherapy about 1:1:1 protocol based on clinical and analytical criteria vs hemotherapy guided by masimo radical® + Rotem® monitoring in massive bleeding casualties. Spanish military medicine experience

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**Background and Goal of Study:** To analyze cost-benefit of treatment according to protocol 1: 1: 1 (1 unit of packed red blood cells: 1 unit of fresh frozen plasma: 1 unit of platelets) vs guided therapy goals with monitoring devices Masimo Radical 7 / Rotem in patients with massive bleeding in military environment.
**Materials and methods:** We performed a cost-benefit analysis of two treatments used in massive bleeding patients based on data collected in the Spanish Military Hospital in Herat (Afghanistan). We have selected oficial price of blood products published by the Ministry of Defense of Spain. The cost of different monitors was provided by commercial agents.
**Results and discussion:** During the study period, 3582 units of packed red blood cells (565 consumed), 278 units of fresh frozen plasma (184 consumed) and 47 units of frozen platelets (21 consumed) were sent to Afghanistan. The cost of blood products was 1 unit of packed red blood cells: €140, 1 unit of fresh frozen plasma: €70, 1 unit of frozen platelets: €450. The cost of blood products shipped (+ not consumed) was €542,090 (€101,430 + €440,660). The price offered by commercial agents was Masimo. Radical® 7: €5,712 and consumables (100 patients): €1,000 while Rotem® device was €29,546, consumables (20 measurements): €1062 and disposables and pipettes (200 measurements): €1,351. The number of casualties with massive bleeding was 36. According to several studies the Monitor Masimo reduces by 47% the units of packed red blood cells and monitor Rotem reduces 84% units of fresh frozen plasma and 41% platelet units. It is assumed as the 80/20 rule hypothesis: patients with massive bleeding have required 80% of total consumption. Therapy 1: 1: 1 could be started since 2010 (not before the lack of logistical capacity).The cost of blood units consumed in massive bleeding casualties was €55,950, while ROTEM and Masimo monitors (monitors + consumables + units of blood) cost was €57,455. The total cost of blood units not consumed was €294,570, however total cost of blood units not employed with two monitors and ensuring logistical support was €103,740.
**Conclusion(s):** Guided therapy by Masimo Radical 7 + Rotem devices is 2,7% more expensive than 1:1:1 treatment in massive bleeding casualties. However, cost of blood products units shipped and not used (€294,570), compared to units shipped and not used employing both monitors (€103,740) is higher (€190,830).

## 01AP08-1

### Presence of a nurse anaesthetist in the operating room decreases mortality rate in high risk patients

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**Background and Goal of Study:** Death during and after operation, *i.e.* perioperative mortality, reflects unsafe practices or poor quality of perioperative care [1]. The question arises as to whether support personnel, *i.e.* registered nurse anaesthetist (RNA) could influence postoperative mortality. Therefore, we evaluated in a survey the relationship between anaesthesia given by a physician alone or a combination of both providers, anaesthesiologist and RNA, on in- and out-hospital 30-day postoperative mortality.
**Materials and methods:** After local Ethics Committee approval, a retrospective survey was performed over a 12-month period, including all consecutively surgical patients, undergoing various surgical procedures under general or loco-regional anaesthesia. For risk stratification, we devised patients into ASA class I-II or III-V. As a large proportion of postoperative deaths occur after patients have been discharged, we recorded mortality up to 30-day after a surgical procedure. Results were expressed as mean ± SD or frequency. Student's *t* and Chi Square tests. The effects of ASA and RNA as their interactions were evaluated using logistic regression method (OR = odds ratio). $P<0.05$ significant.
**Results and discussion:** A sample of 11,176 surgical patients was included in the study. A RNA was present in 28% of the surgical procedures. Globally, 584 patients (5.2%) died during the 30-day postoperative period. Among them, the proportion of ASA>II patients was 72% compared with 18% in the survivals and a RNA was present in 24% compared to 28%. Mortality rate in the entire population decreased significantly with presence of a RNA from 5.5% to 4.6% (OR=0.82; $P=0.044$). Logistic regression shows that mortality rate increased with ASA score (OR = 12.4; $P<0.001$). In patients ASA III-V, presence of a RNA decreased mortality rate from 19% to 15% (OR=0.77; $P=0.044$). Results are presented in Table 1. Further studies are needed to adjust for diffrences in case-mix and co-morbidity.

| ASA Score | No RNA (n=8,031) | RNA (n=3,145) | P-Value |
|---|---|---|---|
| **I-II (n=8,864)** | 109 (1.7%) | 56 (2.2%) | NS |
| **III-V (n=2,312)** | 332 (19.1%) | 87 (15.3%) | 0.01 |

*[Table 1. Postoperative mortality]*

**Conclusion:** Anaesthesia given by a combination of anaesthesiologist and RNA decreased 30-day postoperative mortality in high risk patients when compared to solo attending physician.
**Reference:**
1. Ariyaratnam R, Palmqvist C, Hider P et al. Surgery 2015;158:17-26.

## 01AP08-2

### Influence of quality of recovery on patient satisfaction: a prospective observational cohort study

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**Background and Goal of Study:** Patient satisfaction is an important part of outcome quality and primarily influenced by information, involvement in decision making and continuity of care (1). Quality of recovery (QoR) after surgery and anaesthesia is another part of outcome quality and primarily influenced by physical and mental well-being (2). The influence of QoR on patient satisfaction, however, is not clear. The aim of this study was to evaluate the influence of QoR on patient satisfaction with anaesthesia care.
**Materials and methods:** After approval from the local Ethical Committee patients scheduled for elective in-hospital surgery were selected consecutively to maintain unbiased sample. We used a repeatedly validated 15-item questionnaire (QoR-15) to measure QoR and a previously validated psychometrically developed 13-item questionnaire to measure patient satisfaction (2, 3). To ensure comprehensibility a one week pretest (n=38) was done. Before the day of surgery (baseline health status) and 24h postoperatively patients were asked to complete the QoR-15. One to two weeks after discharge, patients

received the third QoR-15 and the patient satisfaction questionnaire. If no response was received after two weeks, a reminder with the QoR-15 and the satisfaction questionnaire was mailed once. For comprehensibility we aimed at evaluating at least 300 patients (600 patients were planned to recruit; expected response rate of at least 50%).
**Results and discussion:** The response rate was 64% (n=467 with 4 questionnaires out of 734 in total). There were correlations between r=0.1 and r=0.5 of the 10 different quality areas assessed in the patient satisfaction questionnaire with total satisfaction (3 items). A multiple regression model achieved an R2 of 0.56. When testing aspects of QoR, QoR after discharge was included in the model, but this did not change / improve the variance explained.
**Conclusions:** QoR had no supplementary effect on patient satisfaction.
**References:**
1. Heidegger T et al. Patient satisfaction with anaesthesia - Part 1: satisfaction as part of outcome - and what satisfies patients. Anaesthesia 2013; 68:1165-72.
2. Stark PA et al. Development and psychometric evaluation of a postoperative quality of recovery score: the QoR-15. Anesthesiology 2013; 118:1332-40.
3. Nübling M et al. Patientenbefragung im Spital: Revalidierung und Optimierung eines Erhebungsinstrumentes. Psychother Psych Med 2003; 53: 236-42.

## 01AP08-3

### The Anaesthetist is ready to see you now! - Who are we? What we do? How patients view us?

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**Background:** Anaesthetists are multi-skilled peri-operative physicians who play a vital role not only in theatre but also in the acute emergency care of patients. However, some patients do not appear to fully understand the role of the anaesthetist and this may be due to the way anaesthetists present themselves. A recent BMJ article suggested that ,medical titles reinforce a clinical hierarchy and frame the physician-patient relationship as a deferential one. However, medical titles can provide valuable distinction and clarity of roles. To determine if the way we introduce ourselves as anaesthetists affects patient perception of anaesthetists.
**Methods:** A questionnaire conducted of surgical inpatients asked about their perceptions of the role of anaesthetists.
**Results:** Many patients did not understand the role of the “anaesthetist” and found the term ambiguous. Most patients had some understanding of the role of the anaesthetist but a large proportion did not understand anaesthetists are doctors, believing them to be technicians or surgical assistants. Those who did not know what an anaesthetist was did know the role of an “anesthesiologist” and understood them to be highly specialised doctors. Those patients who did not understand the role of the anaesthetist, believed they would understand this better if their anaesthetist introduced themselves as an anaesthetic doctor. Most of the consultants questioned introduced themselves by their title, surname and as an anaesthetist. The majority of junior doctors introduced themselves by their name and the anaesthetist. Most patients believed anaesthetists should introduce themselves as doctors although they did feel more comfortable being on first name basis with their anaesthetists.
**Conclusion(s):** A large proportion of patients did not appreciate the role of the anaesthetist as part of the clinical team. Many patients did not know that anaesthetists are qualified doctors who have had many years of postgraduate training. Interestingly they knew what an anesthesiologist was and felt that the term “anaesthetic doctor” provided less ambiguity.
The way an anaesthetist introduces themselves to a patient influences their opinion of the role of an anaesthetist. Patients felt that the term “anaesthetic doctor” creates less ambiguity and is more reassuring. A patient who understands the role of the anaesthetist may be able to make better use of their anaesthetist’s skills and therefore better healthcare choices.

## 01AP08-4

### Effects of implementation of enhanced recovery pathway for primary arthroplasty: a self-paired comparison

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**Background and Goal of Study:** Enhanced Recovery Pathway (ERP) for primary major joint arthroplasty was implemented in November 2013. It included perioperative administration of pregabalin (75mg, b.d.) and infiltration around the joint using 100-150 ml of a mixture of ropivacaine 0.2% with adrenaline (1:200 000) and tranexamic acid (1g). Peripheral nerve blocks (PNB) were discouraged, as well as intravenous opioids. Additionally, a gram of tranexamic acid was given intravenously. Intrathecal diamorphine (200 to 300 micrograms) superseded intrathecal fentanyl.
**Materials and Methods:** This is an audit of perioperative management and outcome of 59 patients that had one major joint replaced before implementation of ERP and the other joint replaced after ERP, by the same group of clinicians at the same facility. Self-paired comparison would exclude patients’ heterogeneity-related bias.[1] Data were collected retrospectively from patients’ notes following discharge to avoid observer-bias.
**Results and Discussion:** Thirty four patients had total knee replacement and 25 had total hip replacement. ASA status ranged from 1 to 3. Mean age at the 2nd arthroplasty was 70.8 $\pm$ 7.5 years, BMI was 30.6 $\pm$ 4.7, and gap between surgeries was 30.4 $\pm$ 22.5 months. The mean length of stay (LOS) during the 2nd arthroplasty was significantly shorter (Table 1).
Premedication for the 1st arthroplasty was variable; 21 patients had no premedication. Fifty six patients received paracetamol and pregabalin for the 2nd arthroplasty. Different opioids were given postoperatively and expressed as morphine equivalents; the doses were significantly less after the second operation. A significantly less number of patients had PNB in their 2nd arthroplasty. The incidence of vomiting, urinary catheterisation and delayed mobility were statistically indistinguishable.

| | 1st Arthroplasty | 2nd Arthroplasty | p value |
|---|---|---|---|
| LOS (days) | 4.0 +/- 1.0 | 3.2 +/- 0.9 | <0.0001 |
| PCA ( number of patients) | 24 | 0 | 0 |
| Morphine equivalents (mg)-postoperatively | 27.9 +/- 26.9 | 17.9 +/- 20.0 | 0.007 |
| Vomiting (number of patients) | 10 | 7 | 0.44 |
| PNB (number of patients) | 20 | 2 | <0.0001 |
| Delayed mobility (number of patients) | 7 | 2 | 0.16 |
| Urinary catheterisation (number of patients) | 17 | 15 | 0.83 |

*[Outcomes]*

**Conclusion:** ERP streamlines patient care and reduces the LOS and opiate requirement for primary major joint arthroplasty.
**Literature:**
1. Kehlet H, Wilmore D. Fast-track surgery. *Br J Surg* 2005; **92**:3-4.

## 01AP08-5

### The effect of two different general anaesthesia regimes on postoperative sleep quality

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**Background and Goal of Study:** Surgery can lead to postoperative disturbances in sleep patterns with subjective deterioration of sleep quality according to patients’ reports. We undertook this single-blinded study in order to assess the effect of two general anaesthesia maintenance techniques on short- and long-term postoperative night sleep quality.
**Materials and methods:** In this interim analysis, forty eight patients undergoing laparoscopic cholecystectomy were evaluated regarding their preoperative sleep quality with the Pittsburgh Sleep Quality Index (PSQI). Patients were randomized to general anaesthesia maintenance with propofol or desflurane. The quality of sleep during the first and seventh postoperative night was assessed with a sleep diary, with a subjective evaluation of sleep duration,

frequency of awakenings and sleep quality. Sleep quality scale ranged from 1 (worst possible sleep) to 4 (best possible sleep). Long-term sleep quality after surgery was evaluated by the use of PSQI one and three months post-operatively via a telephone interview. Data are presented as mean± SD or as median [25th-75th percentile] depending on normality of distributions.
**Results and discussion:**

| | Propofol group | Desflurane group |
|---|---|---|
| **1st postop night** | | |
| sleep duration(hrs) | 7.8±1.5 | 8.3±1.7 |
| frequency of awakenings(n) | 2[2-3] | 5[3-6]* |
| rating of sleep quality | 3[2.25-4] | 3[2-3]* |
| **7th postop night** | | |
| sleep duration(hrs) | 7.8±1.3 | 8.5±1.6 |
| frequency of awakenings(n) | 1[0-1] | 2[1-2.5]* |
| rating of sleep quality | 4[3.5-4] | 4[3-4] |

*[* significant difference between groups]*

Patients in the desflurane group reported more frequent awakenings and inferior sleep quality in comparison to the propofol group during the first post-operative night. Nocturnal awakenings were also more frequent in the former group on the seventh postoperative night while sleep quality was no longer inferior to the propofol group probably due to overall reduction in the frequency of awakenings in both groups. One and three months after the operation, the quality of sleep as assessed by PSQI scores was no significantly different from baseline in both the propofol and desflurane groups.
**Conclusion(s):** A short-term deterioration of nocturnal sleep occurs after desflurane anaesthesia in comparison to propofol anaesthesia probably attributed to sleep fragmentation. Over time, this impairment in sleep quality tends to subside.

## 01AP08-6

### Intraoperative rise in intraocular pressure in the prone position

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**Background:** Recent studies described visual loss after spine surgery in the prone position. Possible causes include ischemic optic neuropathy induced by high intraocular pressure (IOP). However, little or no information is available on changes in IOP during prone surgery. Here, we measured changes in IOP during spine surgery at prone and supine positions, and also analyzed the risk factors associated with high IOP.
**Methods:** We measured IOP in both sitting and supine positions in patients scheduled for spine surgery. We also measured angulus iridocornealis and fundus features before surgery. On the day of surgery, we measured IOP and blood pressure immediately upon intubation (S1) and during intubation while the patient in supine position and prone position after 30 min (P1), 1 hr (P2) and 2 hrs (P3), upon closure of the incision (P4), immediately upon turning to supine position (S2), and 5 min after turning to supine (S3). As a control, the IOP of patients scheduled for laparotomy in the supine position was measured at the same time points, Age, BMI, operation time, dose of vasopressors, bleeding, and infusion were also recorded.
**Results:** Twenty nine patients in the prone position and 15 patients in the supine position. IOP increased significantly immediately following a change in position from sitting (15.6±2.4) to supine (17.5 ±3.2 mmHg). Intubation (S1) was not associated with any significant change in IOP in both prone (17.6±4.6 mmHg) and supine positions (16.1±3.7 mmHg). However, IOP gradually decreased in the supine surgery group, while it significantly increased in the prone surgery group (P1: 24.6±6.5, P2: 29±7.5, P3: 30±7.3, P4: 32.2±8.4, S2: 29.4±7.1 mmHg), though it returned almost to P1 level within 5 min at S3 (25.5±8.0 mmHg). The above changes in IOP did not correlate with angulus iridocornealis, age, BMI, operative time, blood pressure, dose of vasopressors, or amount of bleeding or transfusion.
**Conclusions:** The highest recorded IOP value was 55.4 mmHg, and was more than 40 mmHg in 7 patients. However, none suffered visual impairment. This finding is similar to a previous study in which none of the participating patients suffered visual impairment even at a mean IOP of 40 mmHg after prone surgery (3). Although long operating time and high BMI are risk factors for high IOP (4), our study could not identify significant risk factors associated with high IOP.

## 01AP08-7

### The correlation between patient satisfaction and patient characteristics: what kind of patient is harder to be satisfied in the Anesthesia Preoperative Evaluation Clinic?

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**Goal of Study:** To investigate the satisfaction of patients with different characteristics by analyzing the patient satisfaction questionnaires of Anesthesia Preoperative Evaluation Clinic (APEC).
**Materials and methods:** The questionnaire was designed with five dimensions including twenty questions about satisfaction which scored by a 7-point Likert scale (1 for extremely poor, 7 for excellent). The five dimensions were environment (E), waiting time (W), patient safety (P), anesthetic plan explanation (A), and service attitude(S). The study was proved by IRB of Chi Mei Medical Center, Tainan, Taiwan (CMH10404-013). The item-level content validity index was 0.85 confirmed by five experts in APEC. The Cronbach's alpha value was 0.95 in the pre-test 50 questionnaires. During May 25 to August 4, 2015, 1000 questionnaires were completed by patients above twenty years old after they visited APEC. The outcome was the satisfaction scores of patients with different characteristics analyzed by t-test and on-way ANOVA.
**Results and discussion:** There were 470 male and 530 female patients with mean age of 51.6 years old participated. The satisfaction scores of five dimensions were all higher in male then female patients (all $p<0.05$) and increased with higher ASA classification (all $p<0.05$). The satisfaction scores were getting higher with patients' age but inversely proportion to their education levels in the four dimensions of (E), (P), (A), (S) (all $p<0.05$) and were in the same trend in the dimension of (W) but not reaching statistically significance. The satisfaction scores didn't show much differences between patients with/without anesthesia experience. Female patients were harder to be satisfied because of more sensitive and need more compassion than males. It's reasonable of more detailed risks explanation in patients with higher ASA classification, which may result in higher satisfaction scores. The younger patients were overlapping with well-educated patients to a certain extent. They tend to seek for more medical information from the internet and ask challenging questions, and to view medical staffs in a high standard.
**Conclusion(s):** Though the patients with characteristics of female, ASA I, younger, and well-educated seem harder to be satisfied, it's still our responsibility to provide professional medical service. It reminds us to give more compassion and patience in daily practice, not just to satisfy patients, but also our initial intent for being a doctor.

## 01AP08-8

### Patient satisfaction with anesthesia and surgery: application of the postoperative quality recovery scale

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**Introduction and Goal of Study:** Anesthesia is still a major concern for patients but previous research has shown that most patients are satisfied with their anesthetic care. We aimed to evaluate if the quality of recovery has influence on patient's satisfaction after anesthesia.
**Materials and methods:** After approval by the institutional ethics committee, an observational, prospective study was performed in patients scheduled for elective surgery. Patients included were older than 18 years, undergoing plastic, gynecologic, urologic and general surgery, under general anesthesia, admitted to the Post Anesthetic Care Unit (PACU). Exclusion criteria were: inability to give informed consent and regional anesthesia.
Postoperative Quality of Recovery Scale (PQRS) was used to identify patients with complete satisfaction (PCS) and patients with incomplete satisfaction 3 days after surgery. PQRS and Quality of Recovery 15 score (QoR-15) were used to evaluate the quality of recovery after surgery. PQRS was used at baseline (up to 14 days before surgery) and after surgery at minute 15 (T15), 40 (T40) and days 1 (D1) and 3 (D3) evaluating recovery in five domains: physiological (PD), nociceptive (ND), emotive (ED), activities of daily living (AD) and cognition (CD). Recovery was defined as return to baseline values for all questions in each domain. Satisfaction was assessed by a five-point rating question. The Mann-Whitney test, Chi-square or Fisher's exact test were used for comparisons.

**Results:** Of 206 patients, 175 completed the satisfaction question on D3. PCS were 86.3%. Incomplete satisfaction was more frequent in patients with incomplete recovery at different timings and in different domains: at 15 minutes in ED (95% vs. 75%, p=0.025), at 40 minutes in PD (25% vs. 5%, p=0.035), at D1 in CD (100% vs. 75%, p=0.014) and AD (77% vs. 54%, p=0.034) and at D3 in AD (48% vs. 26%, p=0.036). Total median QoR-15 score at D1 was higher in PCS (126 vs. 117, p=0.041). Patients with incomplete satisfaction stayed for longer in the hospital (7 vs. 4 days, p=0.003) and in the PACU (p=0.002).
**Conclusion(s):** Patients with incomplete satisfaction had a poor quality of recovery 24 hours after surgery. Beyond this time frame recovery in cognition and activities of daily living played an important role in patient's satisfaction.

## 01AP08-9

### Evaluation of postoperative recovery and satisfaction with anaesthesia and surgery using the Postoperative Quality of Recovery Scale (PQRS) in patients undergoing laparoscopic cholecystectomy

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**Background and Goal of Study:** Quality of recovery is an important endpoint for evaluating anaesthesia and surgery.[1] To capture the long-term impact of anaesthesia and surgery, measures need to include not only physiological measures of recovery but also patient reported outcomes and satisfaction.
The Postoperative Quality of Recovery Scale (PQRS) evaluates recovery in multiple domains (physiological, nociceptive, emotive, cognitive and activities of daily living (ADLs).[2] We aimed to determine overall satisfaction in a cohort of laparoscopic cholecystectomy patients.
**Materials and methods:** Patients undergoing elective cholecystectomy during a 3 month period were included. The PQRS tool was utilised. Baseline testing in all domains was performed preoperatively. Postoperatively, assessments were performed at 15 and 45 minutes after the end of anaesthesia. Late recovery assessments were carried out at day 1 and day 3 postoperatively. Recovery was defined as return to baseline values or better in each assessment.
**Results and discussion:** 10 female and 4 male patients were enrolled. Mean age was 42 years. Physiological parameters (heart rate, respiratory rate etc) displayed 100% recovery at 45 minutes. Patients' reported increased pain at day 1 and 3 with 30% and 25% recovery respectively. This was compared to preoperatively and 35% recovery at 45 minutes postoperatively. Reduced nociceptive recovery correlated with reduced emotional recovery and reduced ability to attend to ADLs (30% recovery at 1 day). Patients displayed 100% cognitive recovery by day 3. All patients reported satisfaction or complete satisfaction with their anaesthetic and surgery despite having not fully recovered in the nociceptive, emotional and ADLs domains. In common with similar studies satisfaction is poor at discriminating quality of care and recovery.[2]
**Conclusion(s):** Patients consistently rate anaesthetic care highly, making it difficult to discriminate quality of recovery. Using the PQRS tool revealed that patients experienced increased pain on day 1 and 3 postoperatively that negatively impacted upon the emotional recovery and return to ADLs of patients' compared to preoperatively.
**References:**
1. Turnbull JE, Luther KM. (1996) Patient satisfaction report paves way to improve care. QRC advis; 13: 1-7
2. Royse CF, Newman S, Chung F et al. (2010) Development and feasibility of a scale to assess postoperative recovery: the postoperative quality of recovery scale. Anesthesiology; 113: 892-905

## 01AP08-10

### Presence of a nurse anaesthetist in the operating room decreases length of hospital stay in high risk patients

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**Background and Goal of Study:** In the field of anaesthesiology, research has focused on equipment and techniques leading to safer practices. Little attention has been drawn on the role of support personnel, *i.e.* registered nurse anaesthetist (RNA), on quality of care. The aim of this observational study is to evaluate the length of hospital stay (LOS) considered as a valuable outcome measure after anaesthesia given by a physician alone or a combination of both providers, anaesthesiologist and RNA.
**Materials and methods:** After local Ethics Committee approval, a retrospective survey was performed over a 12-month period, including all consecutively surgical patients, undergoing various surgical procedures under general or loco-regional anaesthesia. For risk stratification, we devised patients into ASA class I-II or III-IV. The primary end-point was the LOS (day) registered for each patient. Results were expressed as mean ± SD and median [quartile] for LOS. The effect of ASA and presence of a RNA, as their interactions, were evaluated by Cox model. Odds ration (OR) with 95% confidence interval [95%CI]. $P$ <0.05 significant.
**Results and discussion:** A sample of 10,323 surgical patients was included in the study. A RNA was present in 28% of the surgical procedures. For the entire population, LOS increased with ASA scores > II ($P$ <0.001) but was globally reduced by the presence of a RNA respectively from 8.3 ± 12.9 days (median 4 [2-9]) if absent to 7.1 ± 13.1 (median 3 [2-6]) days if present (OR = 1.17 [1.12-1.23]; $P$ <0.001).
Results of the interaction between presence of a RNA and ASA scores are presented in Table 1. In patients with ASA III or IV, presence of a RNA during surgery decreased LOS from 1.5 days (P <0.001).

| ASA Score | No RNA (n=7,366) | RNA (n=2,957) | *P-Value* |
|---|---|---|---|
| **I-II (n=7,617)** | 5.6 ± 9.0 | 5.6 ± 10.9 | NS |
| | 3 [2-6] | 3 [2-5] | |
| **III-IV (n=2,706)** | 15.2 ± 17.9 | 12.5 ± 18.3 | <0.01 |
| | 9 [4-19] | 6 [3-14] | |

*[Table 1. Length of hospital stay (day)]*

The complexity of perioperative care emphasised this anaesthesia team model. Further studies are required to verify our results considering the potential confounding factors.
**Conclusion:** Results of the present survey show that for high risk patients, LOS, considered as an outcome measure, is reduced if a RNA is present in the operating theatre compared to solo attending anaesthesiologist.

## 01AP08-11

### Information about anesthesia: what do our patients want?

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**Background and Goal of Study:** The patient information is a major step in the search for his free and informed consent to a care act. It must be fair and intelligible; therefore adapted to the patient's socio-cultural level, his knowledge and responsiveness.
The aim of this study was to assess the desire for information on anesthesia of patients scheduled for elective surgery.
**Materials and methods:** Evaluation prospective study In university hospital of Batna (April 2015), using an anonymous questionnaire sent to patients or relatives of patients admitted for elective surgery and post-anesthesia consultation. The items discussed were: the obligation of information, its quality and its purpose the desire of patients to know the risks of anesthesia and satisfaction.
**Results and discussion:** 80 Patients scheduled for orthopedic, urological and digestive surgery, agreed to answer the questionnaire. The mean age of patients was 33 years, for sex: 34 F, 46 M. 88.8% of patients did not have an explanation of general anesthesia (GA), and 95.5% did not have an explanation of the risks of GA, 77.1% of patients did not have an explanation of the

regional anaesthesia(RA), 94.9% did not have an explanation of the risks of the RA. 83% have not requested information from their doctor. 40% prefer not to be informed about the risks of anesthesia against 43.8%, while 16.3% remain indifferent. if 100% need information about the anesthesia and / or surgery; the majority (83%) of patients do not dare to request information from their doctors.
Perhaps things will change with the establishment of a "Patient's Charter" few patients have received information about, This contradicts our previous study concerning doctors which showed that 64% give the information systematically. (5%) of the patients were given information about risks of GA and RA and then 52% of doctors tell about the risks to their patients! so who is telling the truth in cases of dispute! At the same time 40% did not wish to be informed of these risks. The desire for information is influenced by gender (female) and by the level of instruction (university).
**Conclusion(s):** The need for information varies depending on the sociocultural level of patients and anesthetists must adapt to this need.

## 01AP08-12

### Influence of mental workload on the performance of anesthesiologists during induction of general anesthesia: a patient simulator study

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**Background and Goal of Study:** We hypothesized that the capacity of anesthesiologists to deal with mental workloads differs based on their clinical experience.
The aim of this study was to reveal the effect of the anesthesiologist's mental workload on their performance during induction of general anesthesia.
**Materials and methods:** Twenty-two participants were categorized into anesthesiology residents (RA group; n = 13) and board certified anesthesiologists (CA group; n = 9). Subjects participated in 3 simulated scenarios (Scenario A: baseline, Scenario B: simple addition tasks, Scenario C: combination of simple addition tasks and treatment of unexpected arrhythmia). We used simple 2-digit integer additions every 5 seconds as a secondary task during the induction of general anesthesia. The rate of correct answers to 40 addition questions was calculated. Four kinds of key actions involved in the induction of general anesthesia were also evaluated in each scenario.
**Results and discussion:** The correct answer rate was not significantly different between both groups (RA: 0.853 ± 0.162 vs. CA: 0.945 ± 0.046, p = 0.109) and the scores of key actions were similar between the two groups in scenario B. In scenario C, the correct answer rate was significantly higher in the CA vs. the RA group (CA: 0.736 ± 0.051 vs. RA: 0.370 ± 0.050 p = 0.0007,) as was the score of key actions for maintenance of anesthesia.
**Conclusion(s):** In a serious clinical situation, anesthesiologists might not be able to adequately perform both the primary and secondary tasks. This tendency is more apparent in young anesthesiologists.

## 01AP09-1

### Does fluid responsiveness necessarily mean the need for fluid replenishment?

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**Background and Goal of Study:** While most current goal-directed therapy[1] protocols base decision-making on the identification of the individual in the Frank-Starling curve, clinical sense is always advised before deciding to implement therapy. In fact, some authors mention that fluid responsiveness can be a common state in healthy human beings[1].
With the present study we aimed to ascertain that claim.
**Materials and methods:** We implemented an observational, longitudinal study where 31 ASA 1 and 2 volunteers were each submitted to two transthoracic echocardiographic evaluations on different days, and their position on the Frank-Starling curve inferred from the degree of variation of aortic VTI with the passive leg raise manoeuvre[2]. Variation over 10% was considered as a sign of fluid responsiveness, whereas a variation of less than 10% meant the individual was on the plateau fase of the aforementioned curve.
**Results and discussion:** 20 of the determinations corresponded to individuals with an aortic VTI variation with passive leg raise above 10%, constituting roughtly a third of the total.
**Conclusions:** Despite the relatively small number of echocardiographic determinations made (62) the fact that a third of the individuals proved to be on the ascending limb of the Frank-Starling curve proves that this position is normal in healthy individuals, which means that fluid responsiveness does not always equate to the need for fluid replenishment. That should be taken into account when dealing with critical patients, as defended by other authors[3], with critical appraisal of the whole haemodynamic state of the patient.
**References:**
1. Slama M, Maizel J. Chapter 6 - Assessment of Fluid Requirements: Fluid Responsiveness. In: Backer D, Cholley BP, Slama M, Vieillard-Baron A, Vignon P, editors. Hemodynamic Monitoring Using Echocardiography in the Critically Ill. Berlin, Heidelberg: Springer Berlin Heidelberg; 2011. p. 61-69.
2. Ramos FJS, Azevedo LCP. Assessment of fluid responsiveness in patients under spontaneous breathing activity. Rev Bras Ter Intensiva. 2009;21:212-218.
3. Magder S. Fluid status and fluid responsiveness. Curr Opin Crit Care. 2010;16:289-296.
**Acknowledgements:** The authors would like to thank all volunteers, members of the Echocardiography Laboratory of Santa Cruz Hospital, Lisbon, and the Anaesthesiology Department of Occidental Lisbon Hospital Centre.

## 01AP09-3

### Evaluation of the stroke volume variation index as a predictor of fluid responsiveness during orthotopic liver transplantation

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**Background and Goal of Study:** The stroke volume variation (SVV) index has been shown to be a reliable predictor of fluid responsiveness in a variety of clinical settings (1,2). However, it has not been extensively evaluated in the setting of orthotopic liver transplantation (OLT). Our main aim was to assess whether the SVV measured by the Flotrac/Vigileo™ system can predict fluid responsiveness in patients submitted to OLT.
**Material and methods:** Twenty-five (25) mechanically ventilated patients undergoing liver transplantation who needed volume expansion were included. All patients were monitored with pulmonary artery catheter, which measured the cardiac output on a continuous basis and the Flotrac/Vigileo™ system. A fluid challenge with 10 ml/kg ideal weight of albumin 2% was attempted during the following stages of surgery: hepatectomy ($T_1$), anhepatic phase ($T_2$), up to 30 min after venous reperfusion ($T_3$), up to 30 min after hepatic artery reperfusion ($T_4$), and at the beginning of abdominal closure ($T_5$). Central venous pressure (CVP), and pulmonary artery occlusion pressure (PAOP) and SVV were measured immediately before and up to 5 min after fluid challenge. Cardiac index (CI), measured by pulmonary artery catheter, was used to define responder patients if CI increased by 15% or more after fluid challenge, otherwise, it was considered non-responsive. SVV and all other parameters were recorded at baseline and 5 min after the FC.

**Results and discussion:** Forty-four fluid challenges were performed, with 30 (68.2%) classified as responsive and 14 (31.8%) as non-responsive. Receiver operating characteristic (ROC) analysis showed that SVV could be used to predict fluid responsiveness during OLT ($P$ <0.01).
**Conclusion:** SVV index was shown to be a reliable predictor of fluid responsiveness during OLT. Further studies are warranted to elucidate the role of this and other dynamic indexes in the setting of liver transplantation.
**References:**
1. Shin YH, et al. Utility of uncalibrated femoral stroke volume variation as a predictor of fluid responsiveness during the anhepatic phase of liver transplantation. Liver Transpl 2011; 17: 53-59.
2. Biais M, et al. Uncalibrated pulse contour-derived stroke volume variation predicts fluid responsiveness in mechanically ventilated patients undergoing liver transplantation. Brit J Anaesth 2008; 101: 761-768.

## 01AP09-4

### Fluid responsiveness in the postoperative period: a prospective study in non critically-ill patients

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**Background:** The incidence Fluid Responsiveness (FR) in non-critically ill surgical patients and the proportion of patients in whom Stroke Volume (SV) significantly increases after a bolus of intravenous fluids (Volume Expansion, VE) is unknown after surgery. Although being Fluid Responder (FRer) does not necessarily implies being hypovolemic, it remains to be determined weather postoperative FR is associated with complications. The aims of this prospective study are to determine 1) the incidence of FR in non-critically ill surgical patients after major surgeries, 2) if postoperative FR predicts and it is associated with complications, 3) the proportion of patients in whom SV significantly increases after VE.
**Methods:** Ethic approval: 14-452-SDR; http://clinicaltrial.org registration: NCT02418663. Adult patients undergoing major thoracic or abdominal surgery, not requiring intensive care unit admission, and treated with a surgery-specific Enhanced Recovery Program were enrolled. FR was assessed soon after surgery, and daily for the first 72 h. SV was measured with the ccNexfin® before and 1 min after a fluid challenge (FC) with 250 ml of Lactated Ringer's in 5 min. FR was also assessed "on call" when VE was clinically deemed. A patient was considered fluid responder (FRer) if SV increased ≥ 15% either 1 min after the FC or 1 min after VE, at least 1 time within 72 h. Treating physicians were blind to all SV measurements.
**Results:** FR after a FC was present in 32 over 88 patients (36.4%). Complications occurred in 46.8% of FRer and in 53.1% of non-FRer (Relative Risk, $RR_{crude}$ = 1.54, 95% Confidence Interval, CI=0.90 to 2.65, p-value=0.121; $RR_{adjusted}$ =0.96, 95%CI=0.45 to 2.03, p-value=0.842). After controlling for confounders (age, type of surgery, blood loss, intraoperative volume of intravenous fluids, postoperative negative fluid balance) FR was not an independent predictor of complications (Odds Ratio, $OR_{crude}$ =2.02 95%CI=0.82 to 4.97, p-value=0.124; $OR_{adjusted}$=1.70 95%CI=0.63 to 4.53, p-value=0.291). VE was clinically required in 7 patients (7.9%). Of these, only 1 patient (14.3%) was FRer.
**Conclusions:** These preliminary results suggest that 36.4% of non-critically ill surgical patients are FRer after surgery. After controlling for confounders FR does not predict and it is not associated with complications. Finally, fluid boluses administered based on clinical signs of hypovolemia rarely determine a significant increase of SV and might be potentially harmful.

## 01AP09-5

### Prediction of fluid responsiveness in the beach chair position using dynamic preload indices

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**Background and Goal of Study:** Haemodynamic instability in the beach chair position (BCP) may lead to adverse outcomes. Cardiac preload optimisation is a prerequisite to improve haemodynamics. We evaluated the clinical usefulness of dynamic indices for the prediction of fluid responsiveness in BCP patients under general anaesthesia.
**Materials and methods:** Forty-two patients in the BCP under mechanical ventilation received colloids at 6 ml $kg^{-1}$ for 10 min. Stroke volume variation (SVV), pulse pressure variation (PPV), pleth variability index (PVI), transthoracic echocardiographic stroke volume index ($SVI_{TTE}$), and haemodynamic data were measured before and after the fluid challenge. Patients were considered responders to volume expansion if the stroke volume index increased by ≥15 %.
**Results and discussion:** The values of SVV, PPV and PVI before fluid loading in the BCP were closely related to the volume-induced percent changes of $SVI_{TTE}$, with the highest correlation observed for PPV ($\gamma$ = 0.662; $P$ <0.001). Volume-induced percent changes of SVV, PPV and PVI were also related to the volume-induced percent changes of $SVI_{TTE}$, with stronger correlations for PPV and PVI than for SVV ($\gamma$ = -0.453, $P$ = 0.006; $\gamma$ = -0.423, $P$ = 0.011; and $\gamma$ = -0.370, $P$ = 0.019, respectively). The area under the curve (AUC) of the receiver operating characteristic (ROC) curves that predicted an increase in $SVI_{TTE}$ ≥ 15% were 0.83 for SVV (95% confidence interval [CI], 0.65-0.94, $P$ <0.001), 0.81 for PPV (95% CI, 0.77-1.00, $P$ <0.001) and 0.79 for PVI (95% CI, 0.56-0.92, $P$ = 0.011). The optimal threshold values to discriminate between the responders and non-responders to fluid administration were 12% for SVV (sensitivity, 92; specificity, 57), 15% for PPV (sensitivity, 86; specificity, 85) and 10% for PVI (sensitivity, 80; specificity, 70).
**Conclusion(s):** SVV, PVV and PVI are reliable predictors of fluid responsiveness in patients placed in the BCP during mechanical ventilation. Nevertheless, the optimal cut-off values were different for these dynamic preload indices, with PPV being a better predictor than PVI based on the AUCs of the ROC curves. The three dynamic preload indices may be useful in guiding fluid therapy in patients undergoing surgery in the BCP.

## 01AP09-6

### Stroke volume variation (SVV) and fluid responsiveness in major gynecological surgery evaluated with ClearSight

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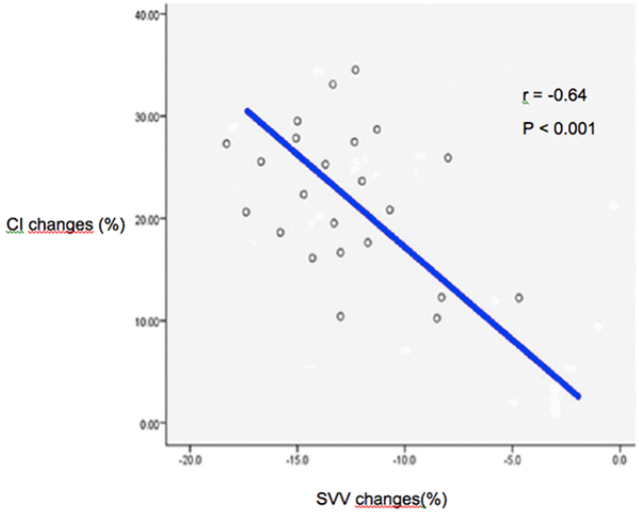
**Background and Goal of Study:** Stroke volume variation is the percentage change between the maximal and minimal stroke volumes (SV) divided by the average of the minimum and maximum over a floating period of 30 s. It enables prediction of volume responsiveness in ventilated and high risk patients (1). In our study we used ClearSight system as non invasive method to evaluate the fluid responsiveness during major gynecological surgery.
**Materials and methods:** A systematic multicentric review of our recorded data was analyzed. Twenty-three ASA II-III patients undergoing major gynecological surgery were considered to manage the intraoperative hypotension. The stroke volume variation (SVV) and the Cardiac Index (CI) were monitored during the entire surgical surgical procedure. The patients were assigned to receive 500 ml crystalloids when CI≤ 2.5 and SVV ≥ 15%. A p value <0.05 was used for statistical significance.
**Results and discussion:** Mean SVV and CI were 20.5 ± 3.4 % and 3.3 ± 0.4 l/min/$m^2$ before intravenous fluid loading respectively and were 12.3 ± 3.7% with mean increase in CI of 0.75 l/min/$m^2$ (95% Confidence interval (CI): 0.41 to 1.1) after volume expansion. Changes of CI in response to fluid loading were correlated to baseline values of stroke volume variation (r = 0.63, P = 0.02) and changes in Cardiac Index were significantly correlated to percent-

age changes in stroke volume variation (r = -0.64, P <0.001), (Figure 1).
**Conclusions:** SVV measured by ClearSight seems to be a reliable noninvasive method for assessing the fluid responsiveness in ASA II-III patients during major and high risk gynecological surgery. Moreover, it adequately reflects alterations in CI and SVV during fluid loss and shift and volume replacement.
**Reference:**
1. Lahner D, Kabon B, Marschalek C, Chiari A, Pestel G, Kaider A, et al. Evaluation of stroke volume variation obtained by arterial pulse contour analysis to predict fluid responsiveness intraoperatively. Br J Anaesth. 2009;103:346-5




*[Figure 1. Changes in SVV and CI (%) after fluid load. SVV = stroke volume variation; CI = Cardiac Index]*

## 01AP09-7

### Impact of continuous noninvasive arterial blood pressure monitoring on blood pressure stability during general anaesthesia in orthopaedic patients

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**Background and Goal of Study:** Intraoperative hypotension is a risk factor for acute kidney injury or myocardial infarction[1]. Blood pressure (BP) during general anaesthesia (GA) is usually monitored intermittently using an upper arm cuff (oscillometry). In contrast, noninvasive continuous BP measurement provides a real time blood pressure curve (volume clamp method). This study investigates the impact of continuous BP monitoring compared to intermittent monitoring regarding BP stability.
**Materials and methods:** After approval of the protocol by the local ethics committee and obtaining informed consent from all patients, we studied 81 patients with arterial hypertension and ASA-status 2 and 3. Patients were randomly assigned to control group(C) or study group (S). In all patients BP was monitored oscillometrically (Infinity Delta Monitor, Dräger®, Lübeck, DE) every 3 minutes. In addition, patients in the study group received continuous noninvasive BP monitoring (ClearSight®, Edwards, Irvine, CA). The continuous BP curve was displayed on the patient monitor. GA was then induced and maintained at discretion of the treating anaesthetist, who was unaware of the study's aim. BP values were recorded via patient data management system (Narkodata, Imeso, Gießen, DE) and statistically analysed using student's t test.
**Results and discussion:** We analysed oscillometric BP data of 73 patients (C=40; S=33) measured during the first 30 minutes after induction of GA. Mean age was 70 yrs., 49 patients were female. Baseline values (in mmHg) before induction of GA of systolic arterial pressure (SAP) and mean arterial pressure (MAP) showed no statistically significant difference (SAP: 140 (C) vs. 150 (S); MAP: 108 (C) vs. 112 (S)).
Analysis of the first 30 minutes of GA revealed BP values (mean (SD)) in mmHg of 127(29) (C) vs. 138(32) (S) (p<0,001) and 97(22) (C) vs. 102(23) (S) (p=0,007) for SAP and MAP, respectively. Lowest values were 47mmHg (C) vs. 54mmHg(S) for SAP and 34mmHg(C) vs. 40mmHg(S) for MAP. The cumulative dosage of norepinephrine and fluid administered within the first hour after induction was not statistically significant different between C and S.
**Conclusion(s):** A real time BP curve enables the treating anaesthetist to react immediately to changes in the patient's BP. Hypotension following induction of GA is less pronounced when continuous BP monitoring is used.
**Reference:**
1. Walsh M, Devereaux PJ, Garg AX, et al.Anesthesiology 2013:119(3):507-515

## 01AP09-8

### Evaluation of combined effect of remifentanil and desflurane on blood pressure during anesthesia induction using response surface model

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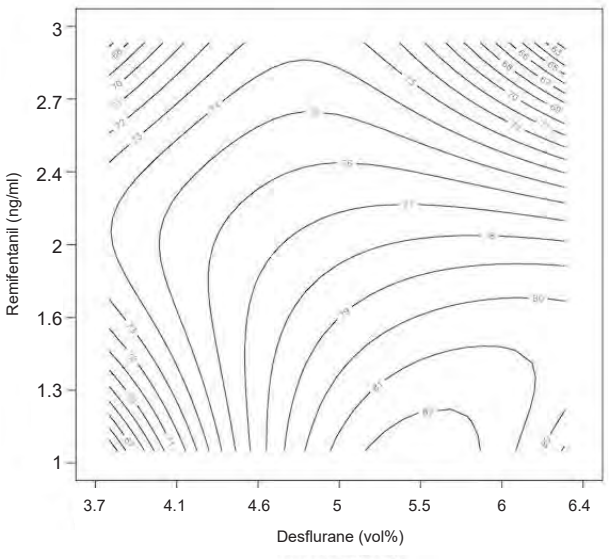
**Background and Goal of Study:** High initial concentration of inspired desflurane (DES) after intravenous induction of anesthesia can increase blood pressure (BP) significantly. To attenuate this response, opioids are commonly used with DES during induction. We conducted this study to evaluate DES and remifentanil(REMI) drug interaction during anesthetic induction using response surface model (RSM).
**Materials and methods:** Hospital Ethics Committee approval and patients' informed consents were obtained. RSM with the central composite design was employed and the fourteen combination groups with 5 patients in each were produced. After intravenous induction with propofol, patients received REMI infusion (effect site concentration, 1-3 ng/ml) and DES inhalation (inhaled dial settings, 3.7-6.2 vol%) at various concentration pairs. BP measured shortly before endotracheal intubation was taken for analysis.
**Results and discussion:**




*[Response surface model graph]*

The RSM graph describes the combined effect of REMI-DES on mean arterial blood pressure just before endotracheal intubation. The result was in accordance with our clinical observations that higher BP was produced as the concentration of DES increased. REMI concentration between 1-2 ng/ml, the decrements of DES concentration effectively lowered BP, but this could result in insufficient anesthesia. REMI effect site concentration between 2-3 ng/ml, the increments of REMI concentration efficiently reduced BP in the studied range of DES concentration.
**Conclusion(s):** RSM demonstrates that DES has a predominant effect on the BP where REMI effect concentration lies between 1-2 ng/ml and REMI takes over this dominance where its concentration between 2-3 ng/ml.

## 01AP09-9

### Effects of induction of anaesthesia on microvascular reactivity monitored by near-infrared spectroscopy

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**Background and Goal of Study:** Induction of anaesthesia causes significant haemodynamic changes, but little is known about its effects on the microcirculation. Yet, alterations in microvascular perfusion are known to be associated with impaired tissue oxygenation and organ dysfunction.[1] Microcirculation can be assessed by measurement of the postocclusive reactive hyperaemia (PORH) response, which is a reproducible transient increase in blood flow after release of an arterial occlusion.[2] In the present study, we evaluated the effects of anaesthesia induced physiological changes on microvascular reactivity.
**Materials and methods:** After approval by the local research ethics committee and written informed consent, 35 adult patients scheduled for elective coronary artery bypass grafting surgery were recruited. PORH was measured with the use of near-infrared spectroscopy (NIRS), a non-invasive method for assessing tissue oxygenation and microvascular reactivity continuously.[2,3] A NIRS sensor (Foresight) was applied on the forearm and arterial occlusion was achieved by inflating a blood pressure cuff. Microvascular reactivity was evaluated with PORH before and 30 minutes after anaesthesia induction. Oxygen consumption, recovery time (time from release of cuff to the maximum value) and rate of recovery were determined. Data were expressed as median [minimum, maximum] and were compared using the Wilcoxon signed rank test.
**Results and discussion:** Tissue oxygen saturation was significantly higher after induction of anaesthesia (70% [54,78] vs 73% [55,94], p=0.015). Oxygen consumption decreased significantly after induction, appreciable by the higher minimum tissue oxygen saturation (45% [29,69] vs 53% [28,81], p<0.001) and the slower oxygen consumption rate (11 %/min [4,18] vs 9 %/min [5,16], p<0.001). After induction of anaesthesia, recovery times were significantly longer (40 sec [20,120] vs 48 sec [24,356], p=0.004) and the rate of recovery was significantly lower (114 %/min [12,497] vs 80 %/min [3,271], p<0.001).
**Conclusion:** The longer recovery times and slower rates of recovery indicate impaired microvascular reactivity after induction of anaesthesia.
**References**:
1. Vallet B. Crit Care Med 2002; S229 -S234
2. Futier E et al. Critical Care 2011; 15: R214
3. Moerman A et al. Curr Opin Anaesthesiol. 2015; 28:703-9

## 01AP09-10

### Continuous assessment of cardiac afterload using aortic velocity - pressure loop analysis in patients under general anesthesia: pilot study

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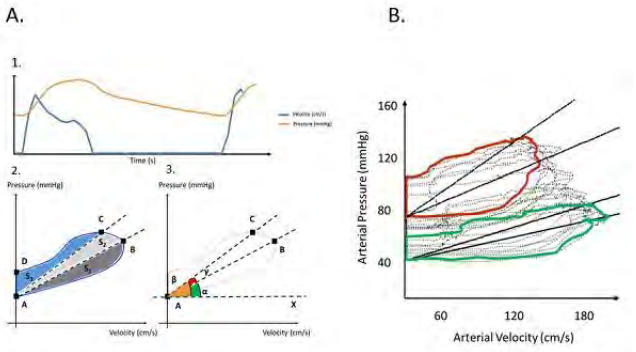
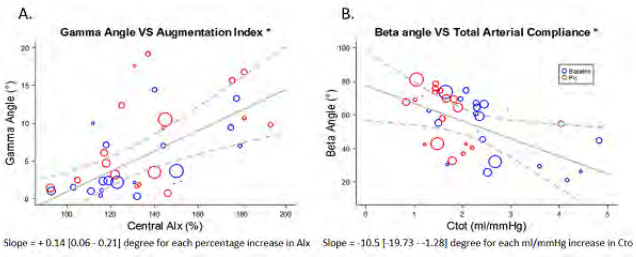
**Introduction:** Cardiac afterload is determined by including arterial resistance, arterial compliance and aortic waves reflection. We developed an integrative analysis of Aortic Velocity and Arterial Pressure signal, as Velocity/Pressure (Vel/Pre) Loops, that should allow a mini-invasive assessment of compliance and Aortic wave reflection.
Our aim was to assess vasopressors-induced alterations in afterload during anesthesia.
**Materials and methods:** 20 patients were included. During anesthesia, cardiac output (CO) and femoral AP were continuously recorded using CombiQ™ monitor (Deltex Medical, Chichester, UK). Both signals were plotted to display Vel/Pre Loop diagram.
We derived 4 points: A (Diastolic pressure), B (pressure at maximal Velocity), C (Systolic pressure) and D (Dicrotic pressure).
Two angles were described: β and γ, between AC and AB lines, respectively, and horizontal axis. An arterial tonometer (Sphygmocor, Nellcor System©) was used to calculate Augmentation Index (AIx) and Total Arterial Compliance (Ctot =Stroke Volume/central Pulse Pressure). When baseline MAP decreased by 20%, vasopressors were administered. Parameters were recorded before (T0) and at vasopressor's peak effect (T1).




*[Figure 1. Examples of Vel/Pre Loops. A. Schematic representation of Vel/Pre Loop. 1. Time domain representation of Velocity and pressure signal. 2. Vel/Pre Loop displaying Surfaces (S1, S2, S3) delimited by A, B, C and D points and the Vel/Pre Loop. 3. Vel Pre Loop displaying Angles (α, β and γ) delimited by AB and AC lines, and horizontal axis. B Example of a Vel/Pre Loop during vasopressor agent administration. Green Line: Baseline; Red Line: Maximal effect of the vasopressor]*

**Results:** We studied 118 measurements. Between T0 and T1, increase in MAP (70 [66-73] vs 91 [84-92]mmHg; p<0.001) was associated with decrease in CO (4.5 [3.8-6.1] vs 3.8 [3.3-4.9]L/min; p<0.001), and Ctot (2.3 [1.9-2.6] vs 1.6 [1.4-1.9]ml/mmHg; p <0.001), as well as increase in AIx (127[116-149] vs 138[124-153]%; p=0.005), β (56[32-65] vs 66[43-72]°; p<0.001) and γ (2.3[1.4-7] vs 8.8[3-11.1]°; p<0.001). An association was found between AIx and γ, and a negative association between Ctot and β.




*[Figure 2. Meta-Regression for association between Cardiac afterload components and Vel/Pre Loop parameters. A. Association between Gamma angle and Augmentation Index (Central AIx). B. Association between Beta Angle and Total Arterial Compliance (Ctot). Samples were obtained both at baseline and at maximal effect of vasopressor agent used. Each 20 patient is represented by both blue and red circle. Radius of a circle represents the number of repeated measure for each patient. * p<0.05]*

**Conclusion:** Vel/Pre Loop assessment could monitor cardiac afterload alterations in anesthetized patients, combining oesophageal Doppler and arterial pressure.

## 01AP09-11

### The performance of PhysioFlow during major abdominal surgery: comparison with two Doppler monitors

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**Background and Goal of Study:** PhysioFlow (Manatec Biomedical, Paris, France) is a non-invasive, continuous cardiac output (CO) monitoring device using signal morphology impedance cardiograph, which is different from previous devices in its independence of baseline thoracic impedance. Our team has recently demonstrated that external and oesophageal Doppler can be used together to reliably track trends in CO intraoperatively.
The study aim was to evaluate the precision and trending ability of the PhysioFlow during major abdominal surgery by comparing with the two Doppler methods.
**Materials and methods:** Adult patients, ASA I, II or stable III scheduled for major abdominal surgery were recruited. Simultaneous PhysioFlow and Doppler measurements, USCOM (USCOM Ltd., Sydney, Australia) and

CardioQ (Deltex Medical, Chichester, England), were performed at 15- to 60-minute intervals. Scatter plots and Bland-Altman plots were drawn to compare PhysioFlow and USCOM data. Comparison between the two Doppler monitors was used as a reference. Trend analysis was performed using four-quadrant and polar plots.
**Results and discussion:** A total of 305 datasets from 20 patients were included. The correlation between PhysioFlow and USCOM was less than that between the two Doppler monitors. The PhysioFlow CO and SV readings had wide limits of agreement with USCOM with a percentage error of 45.7% and 44.6%, which was larger than 32.4% and 32.8% for CardioQ. The concordance rate for $CO_{PF}$ was 95%, which was similar with 96.5% for $CO_{CQ}$. However, the concordance rate was only 77.5% for $SV_{PF}$, much lower than 94.3% for $SV_{CQ}$ (Table). Time plot revealed that heart rate partly compensated for the lack in SV concordance (Figure). The PhysioFlow CO and SV readings also had larger mean polar angle with greater dispersion compared with CardioQ, which indicated lack of agreement.
**Conclusion(s):** PhysioFlow were not in good agreement with Doppler CO monitor in major abdominal surgical patients. It tracked intraoperative CO changes as well as the two Doppler monitors but did not track SV changes reliably, indicating the role played by heart rate.
**Reference:**
Charloux A, Lonsdorfer-Wolf E, Richard R, Lampert E, Oswald-Mammosser M, Mettauer B, Geny B, Lonsdorfer J. A new impedance cardiograph device for the non-invasive evaluation of cardiac output at rest and during exercise: comparison with the “direct” Fick method. Eur J Appl Physiol 2000;82:313-20.

## 01AP09-12

### Examination of the usefulness of pulse pressure in the evaluation of the perioperative cardiac output

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**Background and Goal of Study:** The accuracy of cardiac output (CO) measurement by FloTrac™-Vigileo™ system (FV, Edwards Lifesciences, Irvine, CA, USA) has been progressively improved with several software version upgrades and its clinical use has been widespread in the perioperative setting in Japan. However, FV cannot be used in all institutions. The technology of FV is based on the physical principal : arterial pulse pressure (PP) ∝ left ventricular stroke volume (SV) ∝ standard deviation of arterial blood pressure (BP-STD), and SV = BP-STD • χ. The χ factor compensates for differences in vascular compliance and resistance. Therefore, we focused on PP, and the aim of this study was to confirm whether monitoring of PP changes is useful for hemodynamic management in intraoperative setting.
**Materials and methods:** The study was conducted on 11 patients (ASA II∼III, age 48 to 79 yr) with sinus rhythm and without moderate or severe valve regurgitation. We prospectively monitored the patients by FV, collected 100 consecutive data acquired every minute during two hours. No bolus of cardiovascular agent was injected during the collection period. Data included PP, SV, BP-STD and χ. Correlations between PP and SV, BP-STD, χ were analyzed using the Pearson r-correlation coefficients.
**Results and discussion:** Correlation between PP and SV was $0.052 \leq r \leq 0.823$: a strong positive correlation ($r > 0.7$) was observed in 3 patients and a moderate positive correlation ($0.4 < r < 0.6$) was observed in 4 of 11 patients. Correlation between PP and BP-STD was $0.757 \leq r \leq 0.969$: a strong positive correlation was observed in all 11 patients. Correlation between PP and χ was $0.057 \leq r \leq 0.943$: a strong positive correlation was observed in 8 patients and a moderate positive correlation was observed in 1 of 11 patients. However, χ did not affect to the correlation between PP and SV. In several patients with no correlation between PP and SV, there were very little variations in SV.
**Conclusions:** PP was proportional to SV in 7 of 11 patients, however, there was no correlation between PP and SV in several patients. These results suggest that in order to consider monitoring of PP change as a useful indicator of hemodynamic management further study is needed.

## 01AP10-1

### Goal directed therapy in head and neck oncological surgery with microsurgical reconstruction: effects on complications and free flap viability

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**Background and Goal of Study:** Goal directed therapy (GDT) in Head and Neck surgery has been poorly studied. The aim of our study was to compare surgical outcomes, complications, analytical inflammatory parameters and fluid managements of patients undergoing head and neck oncological surgery with microsurgical reconstruction using GDT vs conventional fluid management (CFM).
**Materials and method:** We performed a retrospective study for patients undergoing head and neck oncological surgery with microsurgical reconstruction, during 19 months. We divided patients into 2 groups, CFM as set by the treating anaesthesiologist and GDT using Flotraq®. We recollected demographic data, inflammatory mediators (platelets and fibrinogen) before, immediately after and at 24h, fluid administration, blood products, medical complications and free flap viability; flaps with infection, necrosis or thrombosis were deemed non-viable. We analyse data using SPSS 21.0® and Prism®, using X2 and non-parametric test when appropriate, $p<0.05$ was considered significant.
**Results and discussion:** 54 patients were recruited and 3 excluded due to insufficient data recollection, 24 patients in CFM and 27 in GDT. Groups had similar age (CFM 54.1±16.7yo, GDT 55.1±17.9yo, p=0.84), weight (CFM 65.0±9.6kg, GDT 67.4±12.6, p=0.47), gender (CFM 9M-15F, GDT 15M-12F, p=0.26) and ASA (CFM and GDT 2[1-3], p=0.5).
Patients in the CFM received more crystalloids (5.0±1.5 vs GDT 2.6±1.1 ml/kg/h, p=0.00), same amount of colloids (9.2±3.3 vs 11.1±5.1 ml/kg, p=0.33), less vasopressors (3/23 vs GDT 20/22, p=0.00) and without differences in transfusion rates (4/22 vs 6/23, p=0.4).
The only time there was a difference in analytical parameters were fibrinogen levels at 24h, which were higher in GDT (413±117 vs CFM 302±68, p=0.00). Complications (CFM 9/24, GDT 10/25) and free flap viability (CFM 19/23, GDT 20/24) showed no differences (p=ns).
In the bivariate analysis no independent factor showed to affect free flap viability; however there was a relationship between number of complications and failure of the flap (p=0.01).
**Conclusion:** GDT didn’t improved free flap viability in our study. This could be due to an overall low complications and non-viability incidence. We acknowledge that the analytical parameters we used could be improved, however we lacked the infrastructure to obtain interleukins levels for example. Further studies are needed to assess the efficacy of GDT in this surgical specialty.

## 01AP10-2

### Can minimally invasive hemodynamic monitoring detect occult hypoperfusion during major vascular surgery?

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**Background and Goal of Study:** There is growing evidence that perioperative optimization of flow-related hemodynamic parameters improves outcome, particularly in high-risk patients.
Major vascular surgery procedures carry a high cardiovascular risk due to patients’ comorbidities and perfusion disturbances related to blood losses, aortic clamping, hypothermia and reperfusion syndrome.
Higher perioperative lactate levels are associated with postoperative complications and worse outcome in high risk patients who were otherwise hemodynamically stable. Goal directed hemodynamic optimization (GDHO) with mini invasive Vigileo®/FloTrac (Edwards Lifesciences, Irvine, CA, USA) system could lead to better monitoring of peripheral perfusion with potential impact on blood transfusion and fluidic therapy.
**Materials and methods:** Following induction of anesthesia and standard monitoring, 62 patients ASA ≥ 3 with three or more cardiac risk factors undergoing elective major vascular surgery were randomized either to GDHO group or control group. In the GDHO group fluids, blood products and vasoactive drugs were used in order to reach predefined Cardiac Index, Stroke Volume Variation, Systemic Vascular Resistance Index and Oxygen Delivery Index endpoints. Control patients were treated according to Central Venous

Pressure, Median Arterial Pressure, Base Excess and Arterial Lactate measurements.The primary endpoint of the study was to evaluate blood therapy needs between groups.
Secondary endpoints were differences in the amount of fluids and blood derivatives used, serum lactate, base excess, arterial pH, MAP, CVP and diuresis.
**Results and discussion:** Total amount of patients transfused didn't significantly differ between groups, while the amount of Blood [500 ml (0-500) vs 0 ml (0-0), P=0.009] , Fresh frozen plasma [0 ml (0-500) vs 0 ml (0-0), P=0.006] and Colloid infused [1000 ml (100-1500) vs 500 ml (500-1000), P=0.0009] was significantly higher in GDHO group. End of surgery serum lactate was significantly lower in GDHO group (1.52 ± 0.52 mmol L-1 versus 1.81 ± 0.56 mmol L-1 in control group, P=0.031). Higher serum lactate wasn't associated with modification in Base Excess and Arterial pH.
**Conclusion(s):** In high risk vascular patients targeting flow-related hemodynamic endpoints with Vigileo®/FloTrac can lead to early identification of occult and potentially reversible microcircular dysfunction.

## 01AP10-3

### Is there a role for telediastolic dimensions of the LV as an estimate of preload in non-critical patients? A study in volunteers

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**Background and Goal of Study:** Estimating fluid responsiveness has been established as an important landmark in fluid therapy, and several indices were developed with such in mind. Presently dynamic preload indices gain ground, but many professionals still rely to some extent on static parameters such as telediastolic dimensions of the LV, namely at short axis views. We decided to assess their usefulness by comparing such parameters with fluid the individual's fluid responsiveness state as defined by aortic VTI variation with the passive leg raise manoeuvre (var $VTI_{Ao}$ PLR).
**Materials and methods:** We performed echocardiographic (TTE) exams in 31 ASA 1 and 2 volunteers (2 exams per volunteer, each in different days), obtaining data on both LV diastolic diameter in PSLAx view (later also used to estimate telediastolic volume with the Teicholz formula), area at the papillary muscles level in the PSSAx view, and var $VTI_{Ao}$ PLR. We then looked for linear correlations between telediastolic dimensions and VTI variation (Scatter plot, Pearson's correlation coefficient) and finally divided our sample into either fluid responsive and non-fluid responsive individuals (using 2 cutt-offs for var$VTI_{Ao}$ PLR described in the literature: 10% and 15%), later comparing the distribution of telediastolic dimensions in both groups.
**Results and discussion:** There was no statistically significant linear correlation between any of the telediastolic dimensions and Var$VTI_{Ao}$PLR. There were also no statistically significant differences in the distribution of telediastolic dimensions between fluid responders and non-fluid responders, as defined by either of the cut-offs used described in the literature.
**Conclusions:** Even though several studies have emphasized the role of dynamic preload indices and decreased the enthusiasm for static ones such as telediastolic dimensions, they are still used clinically. The present study, however, cannot find a statistically significant relation between these and the validated indices of preload responsiveness for patients breathing spontaneously, which would advise against their use in routine practice.
However, it should be stated that none of our volunteers had extreme deviations in the value of telediastolic dimensions, which consequently does not allow us to infer as to the predictive value of very small ones in critical, haemodynamically unstable patients. Further studies are advised to further clarify the matter in these particular circumstances.

## 01AP10-4

### Assessment of the effects of dexmedetomidine on biventricular function by using tissue Doppler echocardiography during total intravenous anaesthesia in patients with diastolic dysfunction: a randomized, double-blind, placebo-controlled study

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**Background and Goal of Study:** Dexmedetomidine is a commonly used sedative and adjuvant agent to general anaesthesia. Diastolic dysfunction, a predisposing factor of heart failure, is prevalent in the geriatric population. This study evaluated the effects of dexmedetomidine on biventricular function by using tissue Doppler echocardiography during total intravenous anaesthesia in patients with diastolic dysfunction.
**Materials and methods:** Forty patients with ejection fraction preserved diastolic dysfunction grade 2 or 3 were randomly allocated to the Control and Dex group (n=20, each). In the Dex group, dexmedetomidine was given as an initial loading dose of 1.0 $\mu g\ kg^{-1}$ over 10 min followed by a maintenance dose of 0.5 $\mu g\ kg^{-1}\ h^{-1}$. The ratio of peak early diastolic transmitral or transtricuspid inflow velocity to early diastolic mitral or tricuspid annulus velocity (LV or RV E/e') and left or right ventricular myocardial performance index (LV or RV MPI) were measured at before (T1), and at 20 min (T2), 40 min (T3), and 60 min (T4) after the administration dexmedetomidine or saline.
**Results and discussion:** The Dex group showed significant decrease of heart rate (P=0.038), and increase of mean blood pressure (P<0.001), LV E/e' (P=0.025) and LV MPI (P<0.001) on a linear mixed model analysis. Also, the Dex group showed significant increase of RV E/e' (P<0.001) and RV MPI (P=0.028) compared to those of the Control at T2, T3 and T4.
**Conclusion(s):** Dexmedetomidine administration was deteriorated biventricular function in patients with diastolic dysfunction. We suggest careful consideration and a need for reducing dosage when administrating dexmedetomidine in patients with diastolic dysfunction.

## 01AP10-5

### A comparison of the combination of granisetron and dexamethasone versus the combination of ondansetron and dexamethasone for the prevention of postoperative nausea and vomiting in patients undergoing spinal disc surgery

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**Background:** PONV are common & distressing symptoms after surgery performed under GA.Incidence of PONV after balanced GA is 20%
Selective serotonin type 3 (5-HT3) receptor antagonists are considered a first-line in prevention of PONV with high efficacy and safety. Combination of both 5-HT3 antagonists and dexamethasone is an attractive choice for prophylaxis of PONV
**Goal:** Comparing the effect of Granisetron+Dexamethasone to Ondansetron+Dexamethasone in preventing PONV during the first 24hrs after extubation in spinal disc surgery under GA
**Materials and methods:** Randomized double blinded study, 40 patients undergoing Spinal disc surgery under GA randomly allocated into 2 equal groups:
• Group G :n = 20 patients(1mg IV granisetron+8mg IV dexamethasone)
• Group O :n= 20 patients ( 4mg IV ondansetron+8mg IV dexamethasone)
Dexamethasone was given immediately after induction of GA
Gransetron or Ondansetron was administered approximately 15 min before extubation.
**Results and discussion:** Treatment groups were generally similar with regard to baseline characteristics

| Parameter | G group | O group |
|---|---|---|
| Age (Year),median + range | 49 (25 - 61) | 47 (35 - 62) |
| Weight (Kg),mean ± SD | 77± 6.7 | 76± 11 |
| Smokers, n(%) | 14(70) | 6(30) |

*[Demographic data]*

In this study on 40 patients undergoing spinal disc surgery enrolled at Kasr Al Ainy Hospitals.

| | Group G n=20 | Group O n=20 | P value |
|---|---|---|---|
| No vomiting 0 HOUR | 20(100%) | 18(90%) | 0.07 |
| >0-6 hours | 18(90%) | 18(90%) | 0.5 |
| >6-24 hours | 18(90%) | 20(100%) | 0.07 |
| No moderate or severe nausea 0 hours | 20(100%) | 18(90%) | 0.07 |
| >0-6 hours | 18(90%) | 17(85%) | 0.3 |
| >6-24 hours | 17(85%) | 20(100%) | 0.03 |
| Complete Response 0 hours | 20(100%) | 18(90%) | 0.07 |
| >0-6 hours | 18(90%) | 17(85%) | 0.3 |
| >6-24 hours | 17(85%) | 20(100%) | 0.03 |

*[Summary of Efficacy Results for 0,> 0-6, and> 0-24]*

Rescue drug was Metoclopramide 10mg.The patients were included in safety analyses.No adverse events occurred during the study. No clinically meaningful changes in vital signs were noted.

| | G group | O group | P value |
|---|---|---|---|
| Required Rescue Medications | 1(5%) | 2(10%) | 0.28 |
| Patient's satisfaction | 18(90%) | 17(85%) | 0.3 |
| Drug related adverse effects | 0 | 0 | |

*[miscellaneous]*

**Conclusion:** The efficacy of Granisetron+Dexamethasone was found to be non-inferior to that of Ondansetron+Dexamethasone in preventing vomiting during the 0 to 6 hour interval after surgery but O+D was superior than G+D during 6 to 24 hour interval after surgery.

## 01AP10-6

### Intravenous fluid management do we really know what we prescribe?

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**Background and Goal of Study:** At our tertiary university hospital, more then 250.000 litres of crystalloids and colloids solutions are prescribed per year. At theatre, we observed that many surgical patients arrived with hiponatraemia or that others with traumatic brain injury arrived with 5% glucose infusions. Concerned about these situations, we asked ourselves if we were aware of what iv solutions contained.
**Materials and methods:** We designed a questionnaire in order to find out if the professionals prescribing and administering iv solutions were aware of the content of the solutions available at our hospital (Normal saline, Isotonic glucose saline, 5% glucose, 10% glucose, Gelafundin, Plasmalyte 7.4). They were asked about sodium or glucose content, pH, osmolarity, and about the presence of other electrolytes ($K^+$, $Mg^{++}$, $Ca^{++}$). All these data are easily available from the leaflet attached to every solution.320 persons answered the questionnaire: 54 anaesthesiologists, 80 surgical specialists, 95 medical specialists, 45 residents and 46 nurses.
**Results and discussion:** If seen as a whole, we found that the mean % of errors was of 48.1, with a standard deviation of 15.8. Analysed by subgroups: Anaesthesiologists had a mean % of wrong answers of 38.5, medical specialists 47, residents 49.5, nurses 53 and surgical specialists 56 .Analysing each solution, we would like to highlight a few results: Regarding normal saline: 65% of the participants did not know the amount of sodium (154 mEq/L) available, even 15% thought that it had 129 mEq/L. 90% did not know that the pH is 6. 20% thought that it has got potassium.In relation to the 5% glucose solution: 55% of the participants were not aware of the concentration of glucose (50 mg/ml). Only 10% knew that the pH is around 4.5. 66% did not know that it is a hipo-osmolar solution. Analysing the data for Gelafundin; 90% of the participants believed wrongly that it is a hiper-osmolar solution and only 25% knew that it contained sodium (154 mEq/L).We believe that the lack of knowledge of the exact composition of the intravenous solutions, may contribute to potentially serious iatrogenic complications.
**Conclusion(s):** Administration of intrvenous solutions is part of an everyday praxis and part of many protocols. Doctors prescribing iv solutions should know exactly what every solution contains, in order to avoid potentially harmful situations.

## 01AP10-7

### Level of agreement between Nexfin and thermodilution cardiac output in morbidly obese patients undergoing bariatric surgery

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**Background and Goal of Study:** Morbidly obese patients are at increased risk for intraoperative hemodynamic instability, which requires intensive monitoring. While the non-invasive Nexfin® blood pressure monitor may be used in these patients to monitor cardiac output (CO), it is unknown whether the weight-based algorithm of this device also applies to patients with extreme body weight. We therefore investigated the agreement between Nexfin CO and thermodilution-based CO in morbidly obese patients undergoing bariatric surgery.
**Materials and methods:** In 30 patients (BMI>35 kg/m2) undergoing laparoscopic gastric bypass surgery, CO was simultaneously measured by Nexfin and thermodilution-based PiCCO on 12 consecutive perioperative time points. Data analysis included Bland-Altman level of agreement, Clarke's Error Grid analysis for clinical accuracy and a polar plot. The study was approved by the Human Subjects Committee in Nieuwegein, the Netherlands.
**Results and discussion:** The average BMI was 44.6±6 kg/m2. Bland Altman analysis revealed a bias of 0.60±1.62 L/min with limits of agreement from -2.67 to 3.86 L/min. The precision error was 46% and ranged outside the Critchley criteria for agreement of CO devices with a gold standard. Clarke's error grid analysis showed that 72% of values were located in a clinically acceptable zone. Polar plot analysis resulted in an angular bias of 2.61° with radial limits of agreement of -60.08° to 49.82°. Angular concordance rate was 77%, with ranges outside the Critchley criteria for trending.
**Conclusions:** The present study shows a low level of agreement and insufficient trending of CO measurements by the Nexfin compared to PiCCO in morbidly obese patients.

## 01AP10-8

### Short-term heart rate variability parameters and autonomic nervous system reflexes of subjects with diabetes mellitus and subjects with euglycemia in the preoperative period

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**Background and Goal of Study:** Heart rate variability (HRV)has been suggested of having predictive value in assessing early signs of diabetic cardiac autonomic neuropathy. The aim of this trial is to assess variations of HRV parameters and autonomic reflexes in subjects with diabetes mellitus and subjects without glucose metabolism alteration in preoperative period.
**Materials and methods:** Twenty four consecutive patients of ASA II status with mild diabetes mellitus scheduled for elective surgical procedures were allocated to group 1. Twenty four control subjects (matching gender and age to group 1) without alterations of glucose metabolism scheduled for elective surgery were allocated to group 2. Hemodynamic parameters were monitored in preoperative period and ECG was recorded for short periods of five minutes, and analysis was performed by corresponding software. Parameters of time -domain analysis were assessed : mean RR interval(NN), standard deviation of mean RR intervals(SDNN), the root mean square of successive RR interval differences (RMSSD) and parameters of frequency domain analysis were presented as values of logarithmic (natural logarithm) values of the power of the total spectrum of heart rate variability(TP), low frequency band (LF), high frequency range(HF) and LF/HF ratio. Few autonomic nervous system reflexes were performed:
1) heart rate response to standing up (30:15 ratio),
2) heart rate response to deep breathing (maximum-minimum heart rate,
3) Blood pressure response to standing up (postural BP change).

**Results and discussion:** Analysis of the parameters of time domain analysis and logarithmic values of parameters of heart rate variability of frequency domain has shown variations of the values between subjects from both groups.
**Conclusion(s):** The results have shown variations of parameters of short-time heart rate variability with lower values of different parameters in patients with diabetes mellitus in regard to nondiabetic patients, and different ranges of correlation of the positive autonomic tests with lower values of HRV parameters in patients with diabetes mellitus.
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## 01AP10-9

### Is echographic evaluation of the inferior vena cava reliable to predict an individual's position in the Frank-Starling curve?

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**Background and Goal of Study:** A patient's position in the Frank-Starling curve and consequently his response to a fluid bolus are fundamental concepts in present-day goal-directed therapy[1]. However, for patients breathing spontaneously few indices are validated to answer this question, namely aortic VTI variation with the passive leg raise manoeuvre (PLR - gold standard)[2] and, according to some authors, IVC evaluation[1,3]. However, IVC assessment is also seen as a method to ascertain CVP non-invasively, which is an inadequate guide for fluid therapy, which leads us to reconsider its utility in this context.
**Materials and methods:** Observational, longitudinal, study where 31 ASA 1 and 2 volunteers were each submitted to two transthoracic echocardiographic evaluations in different days. Data from IVC characteristics and aortic VTI variation were collected, and contrasted to evaluate the possible relation between them, using Pearson's correlation coefficient, Mann-Whitney test, Kruskal-Wallis test and logistic regression.
**Results and discussion:** There was no statistically significant relation between IVC indices and the standard for fluid responsiveness (aortic VTI variation with PLR).
**Conclusions:** Considering that aortic VTI variation with the PLR manoeuvre is validated by several studies as a marker of fluid responsiveness in patients under spontaneous ventilation, the lack of concordance of the results obtained when those are compared to IVC indices leads us to consider that the latter are probably not good markers of a patient's position in the Frank-Starling curve. Further, larger studies including unstable patients and possibly concurrent CVP measurements are advised before generalizing these conclusions.
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## 01AP10-11

### Continuous noninvasive monitoring of arterial pressure during complex endoscopic procedures to improve patient safety

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**Background and Goal of Study:** During endoscopic procedures, at least intermittent arterial pressure (AP) measurements and pulse oximetry are required for patient monitoring.
However, studies have shown that patients with obstructive jaundice have an increased sensitivity to sedative agents with more hypotension and bradycardia and prolonged recovery time after anesthesia. The CNAP® technology (CNSystems Medizintechnik AG, Graz, Austria) allows continuous noninvasive AP (CNAP) waveform recording based on the volume clamp method.
We hypothesized that the use of continuous noninvasive AP monitoring helps to detect hypotensive episodes earlier and more often in patients undergoing endoscopic retrograde cholangio-pancreatography (ERCP) or percutaneous transhepatic cholangiography and drainage (PTCD) in comparison with intermittent oscillometric AP measurements.
**Materials and methods:** We simultaneously monitored the AP of the study patients a) with intermittent upper arm cuff oscillometry set at 5-minute intervals and b) with continuous CNAP measurements during the complete endoscopic procedure. 77 patients were analyzed in this interim analysis. Hypotension was defined as an AP >10% below the last measured oscillometric value and ≤65 mmHg for the mean AP or ≤90 mmHg for the systolic AP. A hypotensive phase measured by CNAP in the interval between two intermittent AP measurements was defined as a time period of at least 30 seconds during which >50% of the AP values were in the defined range of hypotension.
**Results and discussion:** 66 (86%) and 11 (14%) study patients underwent ERCP and PTCD, respectively. The mean±standard deviation duration of the procedure was 37±22 min. All patients were sedated with propofol. The mean CNAP- and oscillometry-derived values were 93±26 and 97±16 mmHg for the mean AP and 122±34 and 127±21 mmHg for the systolic AP, respectively. In the interval between two oscillometric measurements, one or more hypotensive phases were detected in 25 patients for mean AP and 28 patients for systolic AP.
**Conclusion(s):** In patients undergoing complex endoscopic procedures, continuous noninvasive AP monitoring might allow an earlier detection of hypotensive phases and might therefore help to increase patient safety.

## 01AP10-12

### Does pneumoperitoneum affect perfusion index and plethysmographic variability index in humans?

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**Background and Goal of Study:** We recently reported that pneumoperitoneum increased stroke volume variation (SVV), and upon release of the pneumoperitoneum, SVV decreased significantly [1]. We have asserted that SVV values must be estimated cautiously during pneumoperitoneum [1]. Plethysmographic variability index (PVI) is another dynamic index used to assess fluid responsiveness in patients, and the effect of pneumoperitoneum on PVI is still unclear [2, 3]. We therefore attempted to determine whether PVI and perfusion index (PI) change both before and after pneumoperitoneum in humans.
**Materials and methods:** The 20 patients completing the study had an average (mean ± SD) age of 57 ± 15 years, body weight of 64 ± 18 kg, and height of 162 ± 10 cm. Male:female ratio and cholecystectomy:colectomy ratio were both 13:7. After induction of general anaesthesia, the patient's lungs were mechanically ventilated. Immediately before pneumoperitoneum, baseline registrations of variables were obtained (baseline I), and these variables were measured every min for 5 min after pneumoperitoneum started and immedi-

ately before pneumoperitoneum was released. Baseline II registration of variables was then obtained, and these variables were obtained every min for 5 min after release of pneumoperitoneum.
**Results and discussion:** Compared with baseline I values, after pneumoperitoneum started there was significant increase in SVV at the 2- to 5-min time points. There was significant decrease in PI at the 1- to 5-min time points, and no change in other values including PVI (Figs. 1, 2).
Compared with baseline II values, after release of pneumoperitoneum there was significant increase in PI at the 1- to 5-min time points. There were significant decreases in PVI at the 4- to 5-min time points, and SVV at the 1- to 5-min time points (Figs. 3, 4). Some studies showed that pneumoperitoneum decreased PI and increased PVI [2, 3], but our results were not entirely similar to their results.
We showed new information indicating that PI increased and PVI decreased upon release of the pneumoperitoneum.
**Conclusions:** PI and PVI values must be estimated cautiously during and after pneumoperitoneum.
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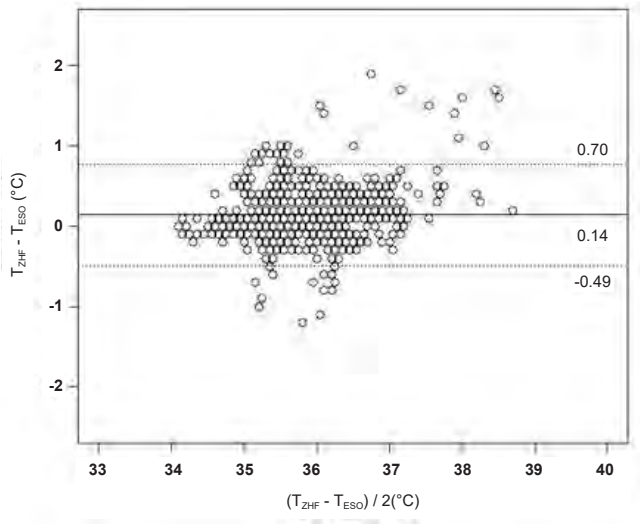


*[Bland-Altman with bias and limits of agreement]*

## 01AP11-1

### Accuracy of zero heat flux cutaneous temperature in adult patients undergoing general anaesthesia

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**Background and Goal of Study:** Core temperature monitoring is mandatory during major surgery. The accurate techniques currently used are mostly invasive, such as pulmonary artery catheter (PAC) and esophageal probe. A new non-invasive cutaneous device, using zero-heat flux method, continuously measures core temperature. This prospective study compared the accuracy of zero-heat flux ($T_{ZHF}$) to esophageal temperature ($T_{ESO}$) in adult patients during surgery.
**Materials and methods:** Patients undergoing general anaesthesia for gut surgery lasting more than 2 hours were included after obtaining informed consent.

Continuous monitoring of temperature was carried out simultaneously by 3M® SpotOn® non-invasive sensor using zero-heat flux method and an esophageal probe (Mon-a-Therm®, Covidien®). Comparison was performed using the Bland-Altman method to determine bias and limits of agreement adjusted for multiple measures per patient.
Multivariate analysis for possible factors influencing accuracy was performed using logistic regression model.
**Results and discussion:** From October to November 2015, 30 patients were included and 1114 pairs of $T_{ZHF}$ and $T_{ESO}$ were collected. Esophageal temperature ranged from 34.1 to 39.3°C. Compared to $T_{ESO,}$ $T_{ZHF}$ bias and limits of agreement were -0.15 ± 0.63° C (figure) with an absolute difference of temperature pairs equal to or lower than 0.5°C for 91.5% [95%CI, 85.9% to 97.3%] of cases. The accuracy of $T_{ZHF}$ was not influenced by the use of norepinephrine or ephedrine boluses. No local or systemic complication was observed.
**Conclusion(s):** The cutaneous sensor using the zero-heat-flux method is accurate and may be recommended to continuously monitor core temperature during gut surgery.
**Acknowledgements:** 3M® supplied free of charge the monitor and the sensors SpotOn®

## 01AP11-2

### Comparison between three temperature monitors during laparoscopic surgery

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**Background and Goal of Study:** The actually used perioperative body core temperature monitors do not give full satisfaction. Recently a new noninvasive monitor using theZero heat flux (ZHF) has been introduced. The aim of this study was to compare between ZHF, esophageal (Es) and tympanic (Tymp) temperature monitors during laparoscopic surgery.
**Materials and methods:** Fifty patients scheduled for laparoscopic urologic surgery were studied. Central temperature was monitored using: ZHF (Spot-on 3M) through a frontal cutaneous sensor, naso-esophageal (Philips 21090A) and tympanic (Thermoscan pro 4000 Welch Allyn). Eight measurements were recorded for every patient.
Statistical analysis for correlation and accuracy were done with Pearson's correlation and Bland-Altman.
**Results and discussion:** Mean age and BMI were 59 ± 14.8 years and 26.4 ± 4.0 kg.m$^{-2}$.

| n=550 | ZHF | Es | Tymp |
|---|---|---|---|
| **Mean °C** | 35.57 | 35.53 | 35..74 |
| **SD** | 0.60 | 0.58 | 0.68 |
| **Correlation with Es; r =** | 0.821 | | 0.659 |

*[Difference in temperature between the 3 monitors]*

| | | 15' after induction | Before Insufflation | 5' after insuffl | 30' after insuffl |
|---|---|---|---|---|---|
| Correlation r = | **ZHF-Es** | 0,7893 | 0,862 | 0,841 | 0,872 |
| | **Tymp-Es** | 0,684 | 0,619 | 0,620 | 0,698 |
| Accuracy (bias)°C | **ZHF-Es** | 0,375 | 0,024 | 0,020 | 0,006 |
| | **Tymp-Es** | -0,046 | -0,028 | 0,210 | 0,328 |
| | | **60' after insuffl** | **90' after insuffl** | **120' after insuffl** | **10' after exsuffl** |
| Correlation r = | **ZHF-Es** | 0,841 | 0,835 | 0,881 | 0,837 |
| | **Tymp-Es** | 0,711 | 0,715 | 0,735 | 0,753 |
| Accuracy (bias)°C | **ZHF-Es** | 0,020 | 0,056 | -0,029 | 0,051 |
| | **Tymp-Es** | 0,304 | 0,329 | 0,280 | 0,244 |

*[Correlation and Accuracy of Monitors]*

We compared ZHF and Tymp referring to Es, as it is the currently used temperature monitor in our institution, although it is not considered as the gold standard.
ZHF and Es were highly correlated except at 15 min after induction of anesthesia. As the naso-esophageal probe was only inserted after induction, this might explain the time needed for Es to become reliable. ZHF showed a high correlation and accuracy to Es. Tymp had a weak to moderate correlation with Es, its accuracy was also low except at the first two readings. As we used for warming patients a forced-air blanket covering the upper part of the body, the Tymp measurement was probably biased by the increased surface temperature of the ears, not reflecting the real core temperature.
**Conclusion:** ZHF proved to be a new reliable method of body core temperature monitoring. It presents the advantage of being noninvasive allowing its use early before anesthesia induction.

## 01AP11-3

### Effect of fluid flow rate on the warming efficacy of fluid warmer

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**Background:** In patients who need intraoperative massive transfusion, cold fluid/blood transfusion can cause hypothermia, which leads to other consequent complications. One of warming methods to prevent hypothermia in these patients is warming intravenous fluid before infusion. Aim of this study was to assess the effect of fluid flow rate on the warming efficacy of fluid warmer.
**Methods:** The room air temperature was controlled at 24°C. Normal saline at the room air temperature was used for experimentation. The fluid was connected with infusion pump and covered with the heater line which the temperature point was constantly set at 42°C. The temperature of fluid after warming was measured by insulated thermistor on the different fluid flow rates; 100, 300, 600, 900, and 1,200 mL/h in comparison with the temperature of fluid before warming. The effective warming was defined as the outlet fluid > 32°C.
**Results:** The room temperature was 23.6±0.9°C. The temperature of fluid before warming was 24.95±0.5°C. There was significant increase on outlet temperatures after warming in all different flow rates (P-value <0.001).The increased temperatures were 10.9±0.1°C,11.5±0.1°C, 10.2±0.1°C, 10.1±0.7°C and 8.4±0.2°C according to flow rate of 100, 300, 600, 900, and 1,200 mL/h. The changes in temperature among all different flow rates were significantly different (P-value <0.001). At all flow rates, the outlet temperatures were above 32°C.
**Conclusions:** These results suggested that the efficacy of warming was inversely correlated with the increase of flow rate. In overall flow rates, the outlet temperature cannot reach 42°C as the set point, but higher than 32°C which benefits to infusion over than the room temperature fluid for maintaining the core temperature in patient.

## 01AP11-4

### Intraoperative factors affecting the postoperative core body temperature in general surgery

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**Background and Goal of Study:** The intraoperative hypothermia often leads to postoperative hypothermia in ICU or in the post-anesthetic care unit (PACU), with a rate of 60%. The goal of the study was the investigation of intraoperative factors that affects the postoperative core body temperature in PACU.
**Materials and methods:** This was a prospective, randomized and controlled clinical trial conducted in a large general hospital of Athens, Greece. The sample of the study consisted of 119 patients who underwent different type of surgeries. Hypothermia was defined when the tympanic temperature of patients was under 36°C. The temperature of patients was measured at the middle of the surgery (intraoperative), at the admission in the PACU and before the discharge of the PACU. The statistical analysis of the results was performed by $x^2$ test and Student t test using the statistical package SPSS for Windows (version 21) and the statistical significance was set to p=0.05.
**Results and discussion:** Hypothermia rate of patients when admitted in PACU was 71.4%. Factors affecting the hypothermia (vs normothermia) rate in PACU were female gender (54.1 vs 29.4%, p=0.001), low weight (79.7±15.3 vs 81.2±23.7 kg, p=0.006), prolonged surgery (130.9±64.9 vs 120.2±52.3 min, p=0.026), and the subarachnoid anaesthetic technique (18.9 vs 6%, p=0.045). The hypothermia on discharge from PACU was affected by female gender (54.2 vs 36.1%, p=0.006), low weight (79.6±15.7 vs 81.5±23.1 kg, p=0.024), severity of surgery (77.1 vs 63.9%, p=0.008), prolonged surgery (138.3±62.8 vs 114.8±50.6 min, p=0.028), propofol (74.7 vs 86.1%, p=0.001), sugammadex (20.5 vs 30.6%, p=0.001), muscle relaxants (71.1 vs 80.6%, p=0.001), whether the patient was intubated or not during surgery (69.9 vs 76.5%, p=0.001), subarachnoid anaesthetic technique (18.1 vs 5.6%, p=0.001) and systolic blood pressure on discharge from PACU (130.7±22.9 vs 123.7±15.3 mmHg, p=0.024).
**Conclusion(s):** Female gender, weight, duration of surgery, anaesthetic technique, and the intraoperative administration of drugs (propofol, sugammadex, and muscle relaxants) influences the body temperature of surgical patients in the PACU. So, we recommend all patients in PACU to be warmed through forced air and warm blankets, in order to achieve normothermia.
**Reference:**
Kim EJ & Yoon H, 2014, Ferguson DP et al., 2011, Karalapillai D & Story D, 2008

## 01AP11-5

### Intra-abdominal temperature changes during robotic assisted laparoscopy

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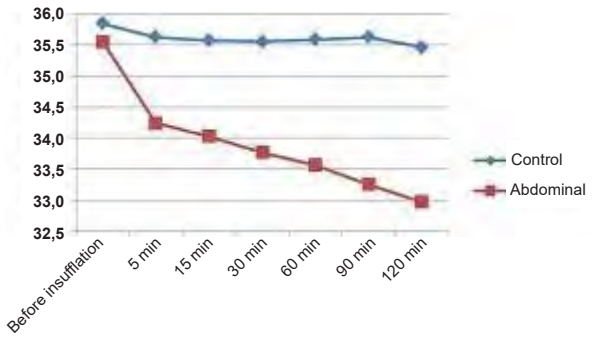
**Background and Goal of Study:** Hypothermia is a common problem during robotic-assisted laparoscopy. The dry $CO_2$ insufflated at operating room temperature (temp) and the limited skin surface available for warming application are the main causes. We studied the intra-abdominal temp changes and its relation with body core temp during robotic-assisted laparoscopy.
**Materials and methods:** Ten consecutive patients scheduled for robotic-assisted radical prostatectomy were studied. After general anesthesia, we measured intra-operative body core temp by a naso-esophageal probe (Philips 21090A), and intra-abdominal temp by a similar probe introduced through a laparoscopic trocar incision and placed midway in the space between abdominal wall and viscera. Patients were warmed with a forced-air warming blanket covering the upper part of the body.
Student's t-test and Pearson correlation were used for statistical analysis.
**Results and discussion:** Mean age and BMI were 63 ± 12.6 years and 27.1 ± 3.4 $kg.m^{-2}$.

| | Before insufflation | 5 min after insufflation | 30 min | 60min | 90 min |
|---|---|---|---|---|---|
| **Core temp** | 35.9±0.2 | 35.6±0.5 | 35.6±0.6 | 35.6±0.8 | 35.6±0.9 |
| Vs before insuffl, p= | | 0.047* | | | |
| Vs after 5 min, p= | | | 0.066 | 0.231 | 0.284 |
| **Abd temp** | 35.6±0.8 | 34.2±1.1 | 33.8±1.3 | 33.6±1.0 | 33.3±1.2 |
| Vs before insuffl, p= | | 0.001* | | | |
| Vs after 5 min, p= | | | 0.029* | 0.0123* | 0.001* |
| **Temp diff** | 0.28±0.47 | 1.39±0.72 | 1.79±0.65 | 2.03±0.48 | 2.38±0.60 |
| **Volume of CO2 in liters** | | 13±8.3 | 78±39.3 | 166±73.0 | 259±135.2 |

*[Core and Abdominal temperatures °C]*

Before insufflation, abdominal temp was slightly lower than core temp. Core temp decreased significantly after insufflation then remained stable. Abdominal temp decreased progressively and significantly with time throughout laparoscopy. The difference between both temp was not as important as could be expected secondary to exposure to the effect of the insufflated dry $CO_2$ at room temperature, equilibrium seems rapid.




*[Core and abdominal temperatures]*

The difference between core and abdominal temp was highly correlated with the volume of insufflated $CO_2$ (r= 0.987).
**Conclusion:** Hypothermia occurs during laparoscopy. There is a small difference between abdominal and body core temp. The decrease in abdominal temp occurs progressively throughout laparoscopy.

## 01AP11-6

### The experimental comparison of warming efficacy by three different fluid warmers at constant infusion rate

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**Background and Goal of Study:** The use of warming devices, which operate on various principles, is useful for maintaining perioperative normothermia as well as reducing morbidity and complications. The Mega Acer Kit® (MAK) is designed for warming the fluid via the lumen of a newly designed heated circuit. We conducted to compare the fluid warming capabilities in three different fluid warmers.
**Materials and methods:** The intravenous fluid warmers used in this study were the Mega Acer Kit® (Group M, n = 10), ThermoSens® (Group T, n = 10) and Standard Ranger (Group R, n = 10). Fluids, which had been stored in the operating room over the previous 24 h, were delivered at 440 ml/h through preheated warming devices. Recording of Fluid temperature was performed at 2 points during 1 hour: the inlet point and the outlet point (76 cm from the warming device) of fluid warmers.
**Results and discussion:** The fluid temperature at inlet point (Tin) showed no significant differences among the groups. The fluid temperature at outlet point (Tout) was significantly highest in group M at all the time points ($P < 0.05$), and the values in group T were not significantly higher than in group R except of values of several time pointes. The steady state values of "Tout" for three fluid warmers were approached 10 min after starting study, and then maintained the constant temperature until 60 min (35.95 ± 0.39°C vs. 36.01 ± 0.39°C, 29.37 ± 0.81°C vs. 29.16 ± 0.84°C, and 29.97 ± 0.55°C vs. 29.2 ± 2.38°C, respectively in group M, T and R at 30 min and 60 min, $P > 0.05$).
**Conclusion(s):** The MAK heated fluid above 35°C, whereas ThermoSens® and Standard Ranger failed to achieve above 35 °C with flows set at 440 ml/h.
**References:**
1. Artif Organs. 2015 Jul;39(7):591-6. doi: 10.1111/aor.12441. Epub 2015 Apr 10.
2. J Anesth. 2015 Aug;29(4):499-507. doi: 10.1007/s00540-015-1994-z. Epub 2015 Mar 14.

## 01AP11-7

### Hemodynamic goal-directed therapy on cytoreductive surgery with hyperthermic intraperitoneal chemotherapy

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**Background and Goal of Study:** Cytoreductive Surgery (CS) with Hyperthermic Intraperitoneal Chemotherapy (HIPEC) results in significant hemodynamic, metabolic and haematological changes[1].
Much variation occurs during intraoperative management of these cases[2].
Controversy has risen on adequate monitoring, fluid therapy, metabolic changes and prevention and treatment of complications.
We present the results of minimally invasive monitoring of Systolic Volume Variation (SVV) and hemodynamic goal-directed therapy.
**Materials and methods:** Prospective, descriptive study on patients with PC who underwent CS with HIPEC between March 2014 and February 2015. We applied an anaesthesia protocol for monitoring and goals regarding hemodynamics, temperature control, fluid therapy, vasoactive drug use and extubation criteria.
We recorded the data at the beginning of anaesthesia, at various times during CS and HIPEC and along the first three postoperative days.
**Results and discussion:** We included 24 patients. The main intraoperative data were: Intraperitoneal Carcinomatosis 13.7 (±8.1), 96% received epidural analgesia, 92% underwent complete cytoreduction, 42% were transfused perioperatively, median fluid infusion was 8.8 ml/kg/h [ 8.1 - 11.1] and urine output 1.5 ml/kg/h [0.8 - 2,1]. Cardiac index and SVV average intraoperatively were 3.39 L $min^{-1}m^{-2}$ [3.1 - 3.6] and 11.5% [4.5 - 18.0]. Maximum SVV was at the end of CS and the beginning of HIPEC at 18% and 16.8% respectively.
Average oropharyngeal temperature during HIPEC was 37.4ºC [36.7 - 38.1]. Cardiac index and heart rate were stable through HIPEC. 50% rate of norepinephrine use and 71% of patients were extubated in the operating room. Postoperative morbidity was 25% on severe complications (Clavien-Dindo grade III-IV) and no mortality was recorded.
**Conclusion(s):** We found great inter-patient variability on fluid requirements. Monitoring SVV allowed us to predict fluid therapy or vasoactive drug requirement during all stages of surgery and to tailor treatment towards greater hemodynamic stability. The absence of a hyper-dynamic state during HIPEC as seen on other studies, can be accounted on the normovolemia accomplished on our series at the beginning of HIPEC.
**References:**
1. Raue W et al. Eur Surg Res. 2009; 43:365-72
2. Corbella D et al. World J Obstet Gynecol 2013; 10; 2: 129-136
3. Zhang Z et al. J Anesth. 2011; 25:904-16

## 01AP11-8

### Hemodynamic response to induction and intubation: a comparison of two different anaesthetic techniques

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**Background and Goal of Study:** Induction and intubation may induce profound alterations of cardiovascular state of the patient. Different techniques and medications administered would influence the hemodynamics during induction.
The aim of this study was to compare the hemodynamic response induction among patients anesthetizied with target-controlled infusion (TCI) of propofol and remifentanil and patients with fentanyl intravenous (iv) and, propofol iv bolus induction.
**Materials and Methods:** This study of 30 normotensive patients scheduled for elective surgery, ASA 1 or 2, and Mallampatin Score 1 or 2. After a standard midazolam premedication and baseline measurement of cardiovascular parameters, the hemodynamic response was compered.
Group 1: induction with remifentanil TCI (site-effect 3.5 ng /ml ) and propofol (site-effect 4.5 mcg /ml ) and Group 2: induction with fentanyl bolus dose (2 microg/kg) and propofol (2 mg/kg) intravenous bolus.
All patients were intubated with rocuronium. Heart rate (HR), and no invasive arterial pressure ( SAP, MAP, DAP) were recorded at three data points: preinduction (T0), after induction-before intubation (T1), 2 minutes after intubation (T2).

**Results:** Fifteen TCI propofol-remifentanil and fifteen with fentanil and bolus iv. propofol were performed. At T1 (postinduction-preintubation) HR value was lower in group 1 than in group 2 (63 vs 75) with significant difference ($p<0,05$). At T2 (2 minutes postintubation) HR value was significantly lower in group 1 (mean 67 vs 78) ($p<0,05$). At T1 and T2, the mean SAP, MAP, and DAP was lowers in group 2 without statistical significance.
**Discussion:** Data suggest that the clinical profile of both techniques were similar. More selective studies will be required to determine the effects on cardiovascular modifications of both techniques during induction of anaesthesia and in special groups such as elderly patients, or ASA physical status III-IV patients.
**Conclusion(s):** Both techniques provided hemodynamic stability, although the heart rate at postinduction-preintubation (T1) and 2 minutes postintubation (T2) was significantly lower in target-controlled infusion (group 1).

## 01AP11-9

### Perioperative *in vivo* pharmacokinetics of succinylated gelatins: a pilot study

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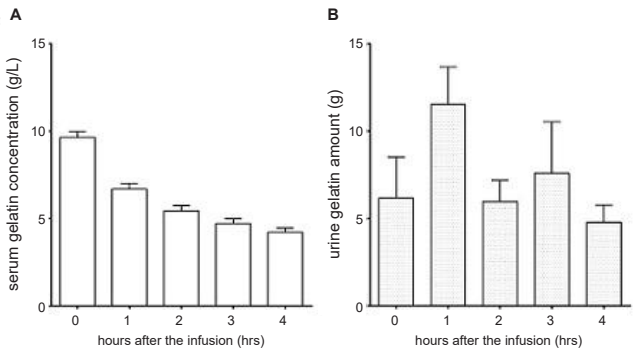
**Background and Goal of Study:** Gelatins are colloids used for volume expansion [1]. There is no information available on the volume expansion and the excretion of gelatins in inflammatory conditions such as surgery. Among the increased pro-inflammatory cytokines, matrix metalloproteinases (MMPs) have gelatins as ideal substrate [2].
Aim of our study is to evaluate if the pharmacokinetics of succinylated gelatins is influenced by inflammation during surgery.
**Materials and Methods:** Observational study conducted on ten patients undergoing major abdominal surgery in the University Hospital "S. Anna" in Ferrara from October to December 2015. Exclusion criteria: age <18 yrs, emergency surgery, NYHA III or IV, Hb <6.2 mmol/L, Creatinine >220 $\mu$mol/L, treatment with corticosteroids or NSAIDs, allergy to gelatins.
The elimination half-life and urinary excretion was determined after the administration of 1000 ml IV of succinylated gelatin.
Five blood and urine samples were collected: after the surgical incision, at the end of the infusion (T0) and one (T1), two (T2), three (T3) and four (T4) hours after the end of infusion.
We assayed the gelatin in the serum and urine by evaluating the amount of hydroxyproline after acid hydrolysis with concentrated HCl. The active form of MMP- 9 and MMP- 2 were measured using an activity assay system. Finally, we calculated urinary flow and albumin / creatine rate (ACR).
**Results and Discussion:** Population: Male n 7, Female n 3, Age 64.4 (±8.4), BMI 26.6 (±2.8).
We observed a time dependent decrease in the gelatin serum concentration, with a maximum at the end of the infusion (Figure 1, panel A, 0 hrs), mirrored by the increase of gelatin in the urine (Figure 1, panel B).




*[Figure 1]*

The plasmatic half-life was 3.6 (±1.2) hours. We observed a significant positive correlation between the the sum of concentration of active MMP-9 and active MMP-2 ($p<0.05$) and the rate of elimination.
**Conclusion:** Our preliminary results suggest that the pharmacocinetic of gelatins is influenced by the expression of matrix metalloproteasis.

**References:**
1. Niemi TT et al. J Anesth 2010; 24: 913-925
2. Volta CA et al. Anesthesiology 2007; 106:85-91

## 01AP11-10

### Respiratory variation of echocardiographic Doppler indices and fluid responsiveness in spontaneously breathing volunteers

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**Background and Goal of Study:** Different dynamic preload indices were developed to identify a patient's fluid responsiveness state, with those relying on respiratory variation proven in ventilated patients, but not necessarily so under spontaneous breathing. We decided to assess their usefulness by comparing them with the individual's position on the Frank-Starling curve, as defined by an appropriate aortic VTI variation with the passive leg raise manoeuvre (var VTIAo PLR).
**Materials and methods:** 31 ASA 1 and 2 volunteers underwent 2 transthoracic echocardiographic examinations on different days, from which we gathered data on respiratory variation of aortic valve VTI, aortic valve Vmax (both from an apical 5 chamber view), descending aorta VTI and descending aorta Vmax (both from a suprasternal view). A linear correlation between these and var VTIAo PLR was then searched with a scatter plot and Pearson's correlation coefficient. We then divided the volunteers into 2 groups according to their fluid responsiveness status (using a cut-off of both 10% and 15% for var VTIAo PLR) and compared the distribution of the former variables in both groups.
**Results and discussion:** There was no statistically significant relation between the respiratory variation of aortic VTI or Vmax and fluid responsiveness. However, there was statistically significant linear correlation between descending aorta VTI and varVTIAoPLR (Pearson's coefficient 0,491, p-value<0,001). When analysing the distribution of both indices between fluid responsive and non-fluid responsive individuals we also obtained a statistically significant difference (Mann-Whitney test p-value 0,012 for a cut-off of 10%, 0,041 for a cut-off of 15%). Such was interesting as aortic VTI is considered more reliable than descending aorta VTI, with the explanation possibly residing on a more stable respiratory pattern allowed for with a suprasternal approach when compared to an apical 5-chamber view, which encompasses more pressing on the thorax, lateral decubitus and a greater influence of breathing on the quality of the image obtained.
**Conclusions:** Respiratory variation of descending aorta VTI appears more promising than respiratory variation of other doppler indices under spontaneous ventilation. Still, there is only a moderate correlation with the standard, which does not allow us to endorse its use. It does however raise an interesting point on the influence of patient manipulation on the results obtained.

## 01AP11-11

### Absolute values of blood pressure fluctuation as an independent risk factor for postoperative delirium: secondary, exploratory analysis of the randomized controlled "Surgery Depth of anaesthesia and Cognitive Outcome"- (SuDoCO) trial

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**Background:** Postoperative delirium (POD) is an acute onset of disturbance in attention/consciousness combined with cognitive deficits. It is unclear if fluctuations in intraoperative blood pressure are independent risk factor for POD.
**Goal:** Secondary analysis of a randomized controlled trial, primarily aimed to test the efficiency of BIS guided anaesthesia for the prevention of POD.
**Methods:** The "Surgery Depth of anaesthesia and Cognitive Outcome"-(SuDoCO) trial, carried out 03-2009 untill 04-2010, included ≥ 60-year-old patients scheduled for elective non-cardiac surgery under general anaesthesia with an anticipated duration of ≥ 60 minutes[1]. Intra-operative hand written blood pressure record sheets were digitalized and analysed using univariate and multivariate analyses.

Endpoint was the cumulative POD incidence (defined according to DSM-IV) within 7 post-operative days.
**Results:** Overall 917 complete data on all independent variables and outcome were available. The mean age was 70.0±6.5 years and n=489 (53.3%) were males. The median surgical time was 2.3 (range: 0.1 up 10.1) hours and 197 patients (21.5%) developed POD. In univariate analysis, patients with POD showed higher mean systolic blood pressure (117.1±10.5 vs. 114.9±11.0 mmHg, p= 0.014) while there were no differences in diastolic blood pressure, mean arterial pressure (MAP) and intraoperative hypotension (IOH). The absolute values of blood pressure fluctuation in systolic and diastolic blood pressure as well as in MAP were significantly higher in patients with POD compared to patients without POD (all p<0.05).
After adjustments for randomization status, age, gender, ASA physical status, MMSE pre-operatively, site of operation, length of hospital stay, antihypertensive medications, and length of procedure, systolic blood pressure fluctuations (p=0.018), diastolic blood pressure fluctuations (p= 0.071) as well as fluctuations in MAP (p= 0.027) were associated with POD, independently from interacting with length of operation (p=0.063, p= 0.086, and p= 0.055, respectively).
**Conclusion:** Fluctuations in systolic blood pressure and MAP, although showing a tendency for interaction with operation time, seem independent predictors for POD. Future studies should evaluate whether blood pressure regimen avoiding fluctuations prevents POD, or whether patients with blood pressure fluctuations have a common risk factor for POD.
**Reference:**
1 Radtke FM et al. Br J Anaesth. 2013;110 Suppl 1:i98-105.

## 01AP12-1

### Restrictive infusion protocol in patients undergiong orthotopic liver transplantation: effects on intraoperative blood loss and postoperative complications

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**Background and Goal of Study:** Liver transplantation (LTx) is associated with substantial blood loss and a high incidence of perioperative blood transfusions. Therefore strategies to reduce blood loss and blood transfusion are warranted. Literature dates support the positive impact of restrictive infusion in liver resections. We hypothesized that the restrictive infusion protocol (RIP) during the preahepatic phase can reduce the volumes of blood loss and transfusion.
**Materials and methods:** We conducted a prospective randomized study which included 23 patients in each group. Study group was managed with RIP. In the study group infusion therapy during preahepatic phase was maintained at 2 mL/kg/h. Bolus of colloids of 250 mL was administered if hypovolemic state was detected (SVV≥13%, GEDI≤500 ml/m2). Vasoactive drug support was given to maintain the mean arterial blood pressure above 65 mm Hg. Control group was managed with standard protocol without infusion restriction. In the control group fluid management was based on mean arterial blood pressure and central venous pressure.
Primary end points were volumes of blood loss and transfusion. Secondary end points were intraoperative fluid volumes, hemodynamic data and the frequency of complications.
**Results and discussion:** A restrictive infusion protocol during the preahepatic phase resulted in a significant reduction fluid volume during the preahepatic phase (1226.8±505.1 vs. 2532.1±1050.6 mL, P<0.01), total intraoperative fluid volume (4595.9±1674.1 vs. 6499.1±1889.9 mL, P<0.01), blood loss (865.4±570.6 vs. 1725.7±750.8 mL, P<0.01), and blood transfusion (384.8±289.3 mL vs. 562±422 mL of packed red blood cells, P<0.05). Renal function was assessed; no differences in mean glomerular filtration rate (GFR) and need for continuous renal replacement therapy (CRRT) in the postoperative period were observed.
**Conclusion(s):** Restrictive infusion protocol during the preahepatic phase significantly reduces intraoperative blood loss, the amount of blood transfusion. We did not observe any differences in GFR and the frequency of CRRT in both groups.

## 01AP12-2

### Acute lung injury after orthotopic liver transplantation is associated with early postoperative elevation of serum Club Cell protein 16

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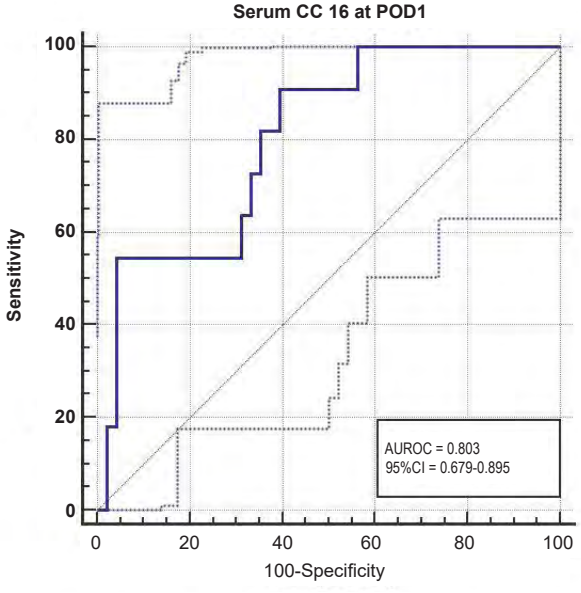
**Background and Goal of Study:** Acute lung injury (ALI) after liver transplantation (LT) is not uncommon by multiple etiologies such as pretransplant pulmonary permeability impairment, large volume of transfusion and ischemia-reperfusion injury. Biomarker of lung injury enabling early detection is lacking. The Club cell protein 16 (CC16) is reported as a reliable ALI biomarker in various conditions but not yet investigated in LT.
**Materials and methods:** Seventy-three consecutive recipients undergoing living donor LT were enrolled. Thoracic fluid indices such as extravascular lung water index (EVLWI), pulmonary vascular permeability index (PVPI) were monitored by using the PiCCO system. Serum CC16 levels in pretransplant state and at the early morning of postoperative day (POD) 1 were compared in recipients with and without ALI.
**Results and discussion:** Thirteen among the 73 recipients developed ALI with significantly longer mechanical ventilation duration and ICU stay. Serum CC16 level at POD1 significantly increased from pretransplant state in ALI group but not in non-ALI group. The changes in serum CC16 level significantly correlated to the amounts of intraoperative blood loss, red blood cell and plasma transfusion. Pretransplant serum CC16 level was also higher in the ALI group and correlated to the age, body mass index, the severity of liver cirrhosis, EVLWI and PVPI values. The areas under the receiver operating characteristic curves for POD1 serum CC16 level to discriminate the ALI was 0.803 (95 % CI: 0.679 to 0.895; p<0.001).




*[ROC of CC16 at POD1]*

**Conclusion(s):** Recipients who developed ALI after LT have worse hospital outcomes and haracterized with first, increases of serum CC16 during early postoperative period which correlated to intraoperative blood loss and transfusion, and second, higher pretransplant serum CC16 level which correlated to pretransplant severity of liver cirrhosis.
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## 01AP12-4

### Anaesthesia for adult renal transplant surgery: survey of current practice in the United Kingdom

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**Background:** Anaesthesia influences patient safety and outcome during renal transplant (RT) surgery. Departmental policies accentuate specifics of RT anaesthesia and may improve anaesthetic quality.
**Goal of Study:** Compare specific aspects of intra- and early postoperative anaesthetic practice in the UK centres. Assess departmental policies, adherence to them, view on their usefulness.
**Materials and methods:** Service evaluation between Sept 2014 and Feb 2015. SurveyMonkey questionnaire distributed to all UK centres for adult RT, with request to share departmental policy for adult RT anaesthesia.
122 anaesthetists from 20 centres responded. 3 centres have not returned any data.
**Individual tactics** for premedication, monitoring, fluid management, use of specific anaesthetic and graft survival related drugs, and post-operative management were studied.
11 centres shared their **policy** for RT anaesthesia with us.
Individual and policy data analyzed against current evidence.
**Results and discussion:** Along with similarities, numerous differences were noted, both between centres and between specialists of the same centre. Notably:
Neuromuscular transmission monitored only by 77% and not highlighted in all policies. To avoid inadequate relaxation (with risk of expulsion of graft, rupture of anastomoses) and reversal, 100% inclusion in policies and compliance advisable.
CVP and MAP targets for reperfusion were equivocal. Majority perceived these in combination (with graft appearance, surgeon's opinion, etc.), not as sole numbers.
Cardiac output monitored by 21%, mainly non-invasively (17%).
Rocuronium used by 5% in view of reversibility with sugammadex, but mostly for hyperkalaemic patient RSI rather than routinely (equivocal recommendation to date for RT).
Majority of UK centres have policies for RT anaesthesia. 59% respondents are satisfied with local policy guidance, 15% see improvement potential. Policies are mainly followed (completely 48%, partially 25%) and provide good background for all specialists, both trainees and consultants. 20% respondents (mainly trainees) feel that policies aid trainee adaptation to standards of practice at the new site/rotation and help trainees working without supervision, increasing their confidence.
**Conclusion:** RT anaesthetic management in the UK is in line with current evidence.
Departmental policies are welcomed by the majority of anaesthetists, found to be helpful and adhered to, but potential for their development and standardization exists.

## 01AP12-5

### Association between haemoglobin concentration and sublingual microcirculation in anaesthetized patients undergoing liver transplantation

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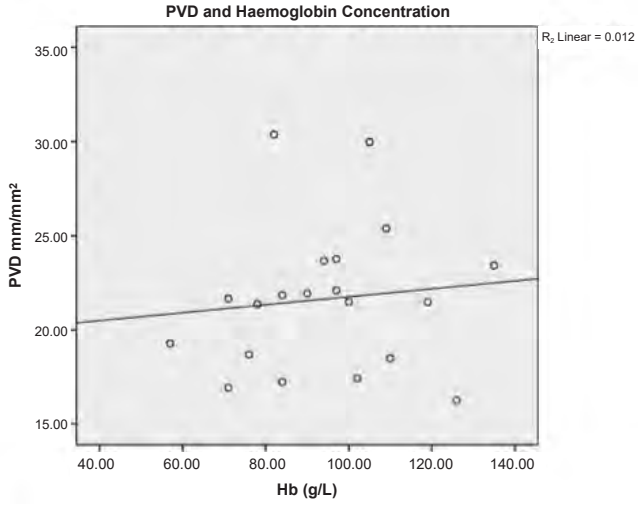
**Background and Goal of Study:** Oxygen delivery is influenced by blood content and microcirculatory flow. Anaemia is associated with liver disease, and mortality after major surgery.[1] Measuring blood flow through the microcirculation allows direct quantification of tissue perfusion.[2] We hypothesise that that blood vessel density shall decrease with decreased haemoglobin concentration [Hb] due to the de-recruitment of capillary networks.
**Materials and methods:** An observational study of patients undergoing liver transplantation was undertaken. After the induction of anesthesia, sublingual incident dark field (IDF) images using a video microscope (Cytocam, Braedius Medical, Netherlands) were recorded (3-5 images per subject) whilst FBC was measured from central venous samples (Pochi, Sysmex, USA). Films were analysed using analysis software (AVA 3.2, Microvision Medical, Netherlands) and average values derived for small vessels (<25 um diameter) for: total vessel density (TVD), PVD (perfused vessel density), PPV % (proportion of perfused vessels) and microvascular flow index (MFI). These were correlated with Hb and haematocrit (HCT) using Pearson's correlation.
**Results and discussion:** 20 patients (70% male) were included (mean age 55.4 years). Mean (SD) Hb was 94.4 g/L (19.8) and haematocrit .288 (0.06). Mean (SD) TVD and PVD were 21.86 (3.87) mm/mm$^2$ and 21.63 (3.87) mm/mm$^2$ respectively, with a mean (SD) PPV of 98.9% (1.02). There was no significant correlation for Hb (p=0.69 for TVD and p=0.65 for PVD) and HCT (p=0.74 for TVD and p=0.60 for PVD) with any of the microcirculatory flow variables.




*[PVD vs Hb]*

**Conclusion:** There was a trend towards higher blood flow measures with higher Hb but this was not statistically significant. Further studies are required to assess the utility of sublingual microcirculatory monitoring and the effect of anaemia in liver transplantation.
**References:**
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## 01AP12-6

### Efficacy of multimodal analgesia with intrathecal morphine in major abdominal surgery

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**Background and Goal of Study:** Patients undergoing major abdominal surgery present a challenging postoperative pain management problem. Adequate pain management influence recovery and outcome after major abdominal surgery. There is growing evidence in literature for alternative techniques in pain management, particular in the setting of ERAS protocols. The goal of this study is to evaluate retrospectively the efficacy of a multimodal approach in pain management for major abdominal surgery based on intrathecal injection of morphine.
**Materials and methods:** Patients (n=117) undergoing major abdominal surgery were enrolled in this study. Types of surgery were, 60 colectomies, 20 pancreatectomies, 12 total gastrectomies, 5 radical nefrectomies, 15 hepatectomies and 5 cases of abdominal masses . All patients had multimodal analgesia consists of
1) an intrathecal injection of 0.5mg of morphine with 35-50$\mu$g clonidine and 5 ml of water saline
2) wound infiltration with high volume bupivacaine 0.5% +0,5mg Adrenaline +8mg Dexamethazone
3) continuous intravenous infusion with morphine 0.5-0.9 mg/h. All patients had general balanced anesthesia consists of propofol/remifentanyl and desflurane. For all patients, VAS at rest and at coughing, time for first analgesic request, incidence of nausea, vomiting, pruritus, sedation and respiratory depression were assessed.

**Results and discussion:** All patients were extubated in theatre. VAS score at rest was 0-2 for all patients during the first 24 hours, up to 3 for the next 24 hours and up to 5 for the third day. For the VAS score on coughing results were 2-3, 4-5, 5-6 respectively. Time to first analgesic request (VAS≥4) was 36-48 hours ( tramadol 50-100mg iv ). Incidence of nausea, vomiting and pruritus were 10%,4%,0% respectively. No patient sedation or respiratory depression occurred. Current literature supports that alternative anaesthetic techniques may be beneficial as part of multimodal analgesia.
**Conclusion(s):** Intrathecal morphine as part of a complete multimodal pain management protocol can be an effective alternative for pain management in major abdominal surgery allowing individualized tailoring of analgesia to the patients thus facilitating recovery.
**Reference:**
M. Hübner at al , Intrathecal analgesia and restrictive perioperative fluid management within enhanced recovery pathway: hemodynamic implications. Journal of the Am. Coll. of Surg. Vol 216 (6):1124-1134 (2013)

## 01AP12-7

### Epidural analgesia in hepatic surgery, safety and effectiveness

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**Background and Goal of Study:** Perioperative epidural analgesia in hepatic surgery is recommended for early multimodal rehabilitation as it provides an optimal dynamic analgesia[1]. However, postoperative coagulation disturbances[2], increase risks associated with epidural catheter withdrawal.
We performed an analysis of effectiveness and complications of epidural analgesia for open liver resection surgery.
**Materials and methods:** Observational case series on patients who underwent open hepatic surgery with epidural analgesia, between March 2012 and February 2015. Criteria used for epidural catheter withdrawal were: adequate pain control (Numeric scale, NS <3), platelets ≥ 80000, INR <1,5.
**Results and discussion:** 73 patients met the inclusion criteria. 58% of cases underwent major hepatectomy, and 15% had Child-Pugh class A cirrhosis. Median blood loss was 1242 ml [723-2048]. 15% of patients were transfused. 3 epidural catheters did not function adequately. 89% of patients related well-controlled rest pain (NS <3) and 8,2% severe dynamic pain (NS > 6). INR increased up to 1.41 [0.99-2.30] on the second postoperative day. Epidural catheter withdrawal was delayed on 6 patients due to coagulation alterations. 3 patients experienced mild motor block. No epidural hematomas were observed. No plasma or platelet transfusion was needed to correct coagulation values.
**Conclusion(s):** Epidural analgesia for hepatectomy resection is a safe practice and provides excellent postoperative analgesia. We found an acceptable rate of delayed removals secondary to coagulopathy and no blood product transfusion was required. Thromboelastography studies[3], have shown a hypercoagulable state in patients following a hepatic resection. These findings question the standard coagulation parameter limits during hepatic surgery.
**References:**
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## 01AP12-8

### Patient satisfaction about recovery and rehabilitation aspects post transplant bronchoscopy under general anaesthesia (GA)

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**Background and Goal of Study:** Lung transplant recipients require regular diagnostic or therapeutic bronchoscopies. Patient's experience, recovery and overall rehabilitation are vital components in assessment of bronchoscopy procedures, particularly with respects to the use of GA. Our aim was to evaluate the post procedure rehabilitation and overall impression of recovery post bronchoscopy performed under GA in Lung Transplant patients.
**Materials and methods:** A proforma was designed by the anaesthetic department, transplant physicians and Trust psychiatrists which was completed by fifty patients before and after their bronchoscopy. Quantitative scoring scales were used to assess symptoms based rehabilitation and overall impression of recovery post procedure (0=extremely good, 10=extremely bad).
**Results and discussion:** Fifty patients underwent bronchoscopies with GA [46/50 (92%)] or awake sedation [4/50 (8%)]. Post procedure scores for successful rehabilitation included:
Feeling of general well being 54% [27/50], free from confusion or disorientation 90% [45/50], ability to breathe easily 70% [35/50], free from headaches or muscles aches 60% [30/50], adequate control of bowel/bladder function 92% [46/50], free from nausea or vomiting 90% [45/50] and free from severe chest pain 86% [43/50]. For descriptive statistics normality was assessed with Kolmogorof-Smirnoff criterion: for P <0.05 (Mean ±SEM): Patients mean score for overall impression of post procedure recovery score 1.46 ±0.31, showing remarkably good recovery following GA. Assessment of choice of anaesthesia for future bronchoscopies in these patients highlighted overwhelmingly that 86% [43/50] chose GA, 12% [6/50] chose awake sedation, 1% [2/50] had no preference for anaesthesia and 100% [50/50] agreed to undergo the procedure again under GA if required.
**Conclusion(s):** Post procedure recovery and rehabilitation results were significantly high due to well-tolerated and low post procedure side effects experienced under GA. These results highlight the satisfactory conditions at Harefield Hospital with use of GA during bronchoscopy and how the majority of patients continue to prefer GA for future procedures.

## 01AP12-9

### Changes in intraoperative fluid management for liver transplantation and their influence on patients' recovery

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**Background and Goal of Study:** Liver transplantation is one of the most challenging procedures in both abdominal surgery and anaesthesia practice. It is burdened with large blood losses and major fluid shifts which often entail extensive fluid replacement therapy and transfusion of blood products. Positive fluid balance and massive transfusion are associated with increased morbidity, longer ICU and hospital stay and decreased survival (1). We analyzed how our approach to volume replacement during liver transplantation has changed during a 5-year period and the influence these changes had on patients' recovery.
**Materials and methods:** In this observational retrospective study we collected data for 155 liver transplantation procedures, 76 from year 2010. and 79 from year 2015. Patients were comparable in terms of age, BMI and length of surgical procedure. We collected data on total volume administered during transplantation procedure (crystalloids, colloids, red blood cells, fresh frozen plasma, platelets, and cryoprecipitate), minutes of mechanical ventilation (from the beginning of the procedure) and length of stay in ICU. Statistical analysis includes Student's t-test.
**Results and discussion:** In year 2010., the mean total volume (measured in milliliters) administered during 76 liver transplantation procedures was 18433.24±7282.21 and in year 2015. during 79 procedures 9640.01 ±6016.69mL, statistical difference is significant, p<0.0001, 95%CI (-10909.55 to -6679.91). Furthermore, we observed a significant difference in duration of postoperative mechanical ventilation (4222.87±9862.99min in 2010.

vs. 1247.30±2174.44min in 2015., p=0.0097) and length of stay in ICU (13.92±14.11 days vs. 5.67±8.11, p<0.0001).
**Conclusion(s):** According to our results, amount of fluids administered during liver transplantation procedure decreased for more than 50% in the observed 5-year period. Explanations for these dramatic changes in our practice may be found in the revised concept of fluid management leaning towards restrictive approach, in changes in perspective on third space losses and certainly in the experience gathered during many successful years in transplantation medicine
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## 01AP12-10

### The impact of hemodynamic management with PiCCO Plus system on the outcome of liver-transplant patients

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**Background and Goal of Study:** Hemodynamic monitoring during liver transplantation plays an important role in the decision making tree and patients'outcome during surgery. Hemodynamic complications during the preanhepatic, anhepatic and neohepatic phases of the surgery may appear and can contribute significantly to the morbidity and mortality of the patients. The aim of this study was to assess the relationship between the hemodynamic parameters measured with PiCCO Plus system and perioperative complications, extubation time, length of Post Anaesthesia Care Unit (PACU) stay.
**Materials and methods:** We retrospectively analysed 25 patients who underwent liver transplantation at Fundeni Clinical Institute between January 2015 and September 2015. Analysis of data included perioperative variables as follows: demographic data, laboratory results, volume of intraoperative blood and fluid transfusion, intraoperative blood loss, hemodynamic parameters obtained with PiCCO Plus system (Cardiac Index, Stroke Volume Variation, Global End Diastolic Volume Index, Systemic Vascular Resistance Index) during the most important phases of the surgery, duration of surgery, the presence of postreperfusion syndrome, perioperative hemodynamic complications, extubation time and length of PACU stay.
**Results and discussion:** Our study included 16 males(64%) and 9 females(36%). Mean(±SD) age was 53.8(±10.9). Mean Cardiac Index(CI) during anhepatic phase was 3.01(±1.95). There was a significant variation of the CI during the three phases of the surgery(p=0.02). Patients with CI<3L/min/m2 during anhepatic phase developed more often post reperfusion syndrome(p=0.05) and they have longer extubation time(12 h vs 5 h,p=0.05). Neohepatic Stroke Volume Variation(SVV) correlates with total intraoperative bleeding(r=0.52). Patients who received less than 1500ml colloids had a greater SVV variation; in contrast crystalloids did not influence the SVV. Six patients developed major complications during the first 5 postoperative days(renal dysfunction, pulmonary complications,severe bleeding).
**Conclusion(s):** Hemodynamic monitoring using PiCCO Plus system during liver transplantation may predict perioperative complications. SVV is an important parameter in fluid management and could influence the choice of resuscitation fluids. PiCCO Plus system is a useful tool for decision making during liver transplant.

## 01AP12-11

### Minimum alveolar concentrations of sevoflurane in patients with end-stage liver disease

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**Introduction:** Growing evidence suggests that patients with end-stage liver disease (ESLD) have decreased anesthetic requirements in comparison to patients with normal liver function.[1,2] Sevoflurane is a volatile anesthetic used to maintain anesthesia during surgery. The potency of a volatile anesthetic is expressed by the minimum alveolar concentration (MAC). The MAC is defined as the alveolar concentration of the volatile anesthetic at which 50% of individuals do not move after a single painful stimulus. The MAC of sevoflurane has not been defined in patients with ESLD.
**Objectives:** The aim of this prospective, controlled, blinded study was to determine whether patients with ESLD have lower requirements of the volatile anesthetic sevoflurane than patients with preserved liver function.
**Methods:** The MAC of sevoflurane was determined in patients with ESLD, who underwent orthotopic liver transplantation, and in patients with no history of liver disease undergoing abdominal surgery serving as controls. The MAC of sevoflurane was calculated applying Dixon's "up-and-down" method. The primary endpoint was the patients' motor response within one minute after initial skin incision. Differences in MAC values between both groups were analyzed using an unpaired t-test. This study was reviewed by the ethics committee of the Medical University of Vienna.
**Results:** 19 patients with ESLD and 18 control patients were included in this study. The mean age of patients in both groups was 57 years. The MAC of sevoflurane was 1.3% in patients with ESLD compared to 1.8% in patients with no history of liver disease (P<0.001).
**Conclusion:** The MAC of sevoflurane is lower in patients with ESLD than in patients with maintained liver function during large abdominal surgery. These results suggest that patients with ESDL require approximately 30% less of the volatile anesthetic sevoflurane than patients with preserved liver function for sufficient anesthesia.
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## 01AP12-12

### Plasmalyte© use in perioperative care of liver transplant recipients: the physiological fluid

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**Background and Goal of Study:** Fluid therapy in perioperative care of liver transplant recipients is one of the key stones of the correct management of these kind of patients. The amount, the moment and the type of fluid is on continuous debate due to different causes. Giving too much fluid to these patients can be deleterious by diluting the coagulation factors and excessive sodium input that can cause neurological damages. Plasmalyte© is the most physiological crystalloid fluid and could be appropriate to use in liver transplant patients.
The goal of our study is to evaluate the use of a Plasmalyte© fluid regimen and the changes in acid-base status, electrolyte disorders and fluid balance.
**Materials and methods:** Prospective study of all liver-transplanted patients in the Hospital General Universitario de Alicante between September 2012 and March 2014. We included demographic data, MELD scale and the reason for the transplant.
At the beginning of the surgery and during all the surgery phases (hepatectomy, anhepatic, reperfusion and neohepatic) we measured glucose, pH, lactate, base deficit, bicarbonate and all electrolytes.

**Results and discussion:** We included 75 patients (61 males, 14 females), of 58 ± 9 years old. Weight 78 ± 16 Kg, height 163 ± 28 cm, MELD score 15 ± 6.

| | Basal | Hepatectomy | Anhepatic | Reperfusion 1 minute | Reperfusion 5 minutes | Neohepatic |
|---|---|---|---|---|---|---|
| Glucose | 102,89 ±35,97 | 111,14 ±32,21 | 101,66 ±31,61 | 134,86 ±39,71 | 135,63 ±38,79 | 148,14 ±56,36 |
| pH | 7,4±0,07 | 7,37±0,07 | 7,36±0,07 | 7,29±0,08 | 7,31±0,08 | 7,32±0,06 |
| Lactate | 1,27±0,56 | 2,02±0,79 | 2,8±1,56 | 3,97±1,17 | 3,5±1,33 | 2,65±1,65 |
| HCO3- | 22,81±3,05 | 21,83±3,22 | 21,27±2,93 | 18,56±5,23 | 19,93±2,79 | 20,95±2,53 |
| Base deficit | -1,36±3,98 | -3,11±4,4 | -3,49±3,90 | -7,07±4,11 | -6,03±3,94 | -4,49±3,44 |

*[Acid-base changes during the surgery]*

| | Basal | Hepatectomy | Anhepatic | Reperfusion 1 minute | Reperfusion 5 minutes | Neohepatic |
|---|---|---|---|---|---|---|
| Mg++ | 1,82±0,3 | | | | | 2,03±0,23 |
| Cl- | 105,08±4,61 | | | | | 105,25±3,86 |
| Na+ | 134,99±6,4 | | | | | 133,85±3,09 |
| Ca++ | 0,96±0,13 | 0,9±0,10 | 4,17±0,7 | 0,86±0,2 | 0,85±0,14 | 0,84±0,10 |
| K+ | 3,88±0,67 | 4,17±0,7 | 3,97±0,63 | 5,41±1,28 | 3,68±0,66 | 3,71±0,64 |

*[Electrolyte changes during surgery]*

Our patients are usually hyponatremic (Na <135, 44/72, 61%). We also found them hypercloremic (Cl > 109, 19/71, 27%) and acidotic (pH <7,35 14/71, 19,7%).

**Conclusion(s):** Plasmalyte© is an appropriate physiological crystalloid for patients during a liver transplant surgery. The special characteristics of this group of patients makes the need to administrate drugs to reverse "iatrogenic" hypercloremic acidosis and hypernatremic states that we sometimes create ourselves.

**Acknowledgements:** Thanks to Jose Navarro for all the help and job.

## 01AP13-1

### Deep neuromuscular blockade versus remifentanyl or sevoflurane to augment measurable laparoscopic workspace during bariatric surgery

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**Background:** It is unclear whether anesthetics, deep neuromuscular blockade (NMB), or high-dose opioids increase laparoscopic workspace. We were able to objectively gauge the laparoscopic workspace, using abdominal compliance (C) and pressure at zero volume (PV0) calculated from a 3-point measurement of the abdominal pressure-volume relationship.(1)

**Methods:** A total of 50 patients undergoing elective laparoscopic bariatric surgery were eligible for the study. APVR was measured in each instance, after administering either remifentanyl, 2 ug/kg; sevoflurane, 1 MAC; or rocuronium, 1 mg/kg. The pressure needed to reach a 3-liter volume was then calculated individually, setting the insufflator to this value (maximum, 15 mmHg). Surgeons ultimately were surveyed on the adequacy of the workspace and disturbance by patient movements to determine whether sevoflurane (1 MAC), high-dose remifentanyl, or deep NMB contributed equally in terms of enhancing the laparoscopic workspace.

A repeated Anova test is used to evaluate the effect of remifentanyl, sevoflurane versus rocuronium on the abdominal workspace and on the incidence of having an insufficient workspace.

The change in each group is tested with the Mann-Whitney U test. The Kolmogorov-Smirnov test was used to describe the factors why some patients moved or had insufficient workspace.

**Results:** Remifentanyl and NMB both succeeded in preventing muscle movements, but only deep NMB reduced pressure at zero volume (PV0) and increased laparoscopic workspace. Calculation of abdominal C and PV0 helped hold intra-abdominal pressure to a minimum, without compromising the laparoscopic workspace, although this was not achieved in every patient.

**Conclusions:** An insufflation volume of 3 liters seems optimal for bariatric surgery at our center. However, this target was not feasible in all patients at a stipulated maximum pressure of 15 mmHg, despite excluding patients with central obesity or avoiding those who failed to shed weight preoperatively.

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## 01AP13-2

### Evaluation on pre-operative assessment of obese patients

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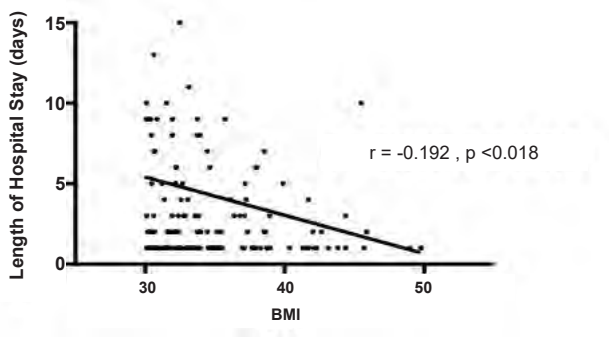
**Background and Goal of Study:** At Queen Elizabeth Hospital Birmingham (QEHB), patients are triaged into consultant-led High Risk (Level 2B and 3) or nurse-led Low Risk (Level 1 and 2A) pre-operative assessment (PAS) clinics, according to patient's comorbidities.However, there are no specific guidelines to triage patients based on their body mass index (BMI) for clinics.

Our aim was to evaluate pre-assessment screening of obese patients at QEHB.

**Materials and methods:** We carried out a service evaluation of PAS of obese patients (≥30kg/m$^2$) undergoing elective general surgery from March 2015 to May 2015 at QEHB.Primary outcome was to measure the level of triage according to patients BMI.Secondary outcome measures were complication rates, cancellations, post-operative care setting and length of hospital stay. Multivariate regression was done to identify risk factors of post-operative complications and length of hospital stay.

**Results and discussion:** A total of 139 patients were included in our analysis. Older patients were more likely to be in the high risk clinics and this was statistically significant between groups
($F = 5.31$, $p = 0.002$).Length of hospital stay increases linearly with increasing levels of levels of pre-op assessment (F= 18.11, p <0.0001).Complication rates in our cohort were 15.8% of which 47.6% were from Level 3 but this was not statistically significant between the different groups
($\chi = 7.22$, $p = 0.065$).With regression analysis, we found increasing rates of complications ($p = 0.006$) and longer length of hospital stay ($t = 3.92$, $p<0.0001$) with increasing surgery grade.There was no significant difference in rates of cancelations between the low and the high risk groups
($\chi = 0.55$, $p = 0.814$).High risk patients were likely to be sent to the wards/ Intensive Care Unit (ICU) than low risk patients following surgery (OR: 8.20; 95% CI: 3.46 - 19.44; p <0.0001).

**Conclusion:** Surgery grade was found to be an independent risk factor of length of hospital stay and complication rates.The use of BMI as a independent risk factor for pre-assessment level is not justified from our cohort. However, further prospective studies are required to validate our findings.




*[Graph 1: Length of Hospital Stay and BMI (kg/m$^2$)]*

## 01AP13-3

### Predictive factors for rhabdomyolysis after bariatric surgery

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**Introduction:** Obesity is a chronic disease and its prevalence is rising all over the world. Bariatric surgery is the best long-term treatment for morbid obesity. Although these procedures are considered safe, there are risks of considerable morbidity and potential mortality.
One of the possible complications is the occurence of rhabdomyolysis (RML) which is characterized by necrosis of skeletal muscle cells. This biochemical clinical syndrome often presents variable severity, ranging from asymptomatic elevation of creatine kinase (CK) to the need for urgent treatment. The aim of this study is to identify risk factors for RML in patients undergoing bariatric surgery.
**Methods:** Monocentric retrospective study that included the patients submitted to bariatric surgery from January 2010 to November 2015. A database was created based on: type of surgery, sex, age, ASA classification, Body mass index(BMI), duration of surgery and occurence of RML up to the 3rd postoperative day (a five-fold increase corresponding to CK>1000U/L defined RML). Categorical variables are presented as frequencies and percentages, and continuous variables as means and standard deviations, or medians and interquartile ranges for variable with skewed distribution. A logistic regression was performed to determine the predictive risk factors of peri-operative RML.
**Results:** 679 patients (120♂ and 559♀) submitted to bariatric surgery (1 duodenal switch, 41 gastric banding, 319 gastric sleeve, 318 gastric bypass), age 44,13±9,92y (min 19y - max68y), BMI 44±8kg/m² (min 27kg/m² - max 82kg/m²), ASA classification II - 523 patients, ASA III - 155, ASA IV - 1, duration of the procedure 146±96min (min 55min - max 535min). RML was diagnosed in 57 patients (8,4%) and none of them needed therapeutic intervention. The most important factors associated with RML were BMI (for each 10kg/m² the risk increased 8,2%) and duration of the procedure (for each 15min the risk increased 2,4%).
**Discussion and conclusion:** RML is a potentially serious complication of bariatric surgery. Incidence of RML obtained in this study was lower (8.4%) when compared with the literature (25%), but the risk factors were similar. It is important to emphasize that postoperative analgesia may mask the initial symptom (myalgia), resulting in delay of the diagnosis and the treatment. Early diagnosis is crutial to prevent RML complications, therefore we suggest pre and postoperative CK measurements in patients with risk factors.

## 01AP13-4

### Perioperative management of severely obese patient with Steinert myotonic dystrophy

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**Background:** Steinert Disease is the most common muscular dystrophy of the adult, characterized by progressive muscular atrophy, myotonia and various multisystem atrophies.
The perioperative management of these patients is a challenge for the anesthesiologists, due to greater risk for perioperative complications.
**Case report:** Man patient, 41 years old, severely obese (BMI 36), with a diagnosis of Steinert Disease, underwent elective nasal septoplasty and inferior turbinate reduction. Comorbidities: chronic atrial fibrillation, dilated cardiomyopathy, mental retardation and restricteve lung disease
Preoperative cardiopulmonary evaluation was requested.
Based on airway assesment, awake tracheal intubation was attempted, under fiberoptic bronchoscopy. The sedation method used intravenous remifentanyl starting at 0,05 mcg/kg/min and propofol starting at 50 mcg/kg/min; then a bolus of 48 mg of rocuronium was administred; propofol and remifentanyl were tritrated up to obtain an adequate depth of anesthesia.Surgery was successfully performed over 30 minutes.
The patient remained hemodynamically stable. Ketorolac 10 mg, paracetamol 1000 mg, local infiltration with ropivacaine 0,5% were used for the postoperative analgesia. At the end of surgery as only two twitches were observed with TOF( train of four), was administreted sugammadex 160 mg. Within 60 sec, all the four twitches to TOF stimuli appear. The patient awoke in the operating room, was extubated, admitted to the intensive care unit for observation and discharged the following day.
**Discussion:** This case illustrates the considerations that must be taken when giving general anasthesia to a patient with Steinert Disease and severe obesity. Perioperative complication are based on the severity of the patient's symptoms and sensitivity to anesthetic agents as well as the potential to precipitate malignant hyperthermia, rhabdomyolysis(1). We can minimize perioperative risk through:
- use ultrashort acting opioids, multimodal analgesic techniques for postoperative pain
- avoid trigger anaesthetic as succynylcholine and halogenated
- do not rush the extubation process and be prepared for postoperative respiratory dysfunction, due to myotonia as well as obstructive sleep apnea.

**References:**
1. F Racca T. Mongini A. Wolfer Minerva Anestesiol. 2013 Apr;79(4):419-33
**Learning points:** The knowledge about the disease and the proper anesthetic planning are extremely important when managing patients with Steinert disease and severe comorbidities.

## 01AP13-5

### Context-sensitive decrement times for inhaled anesthetics in obese patients

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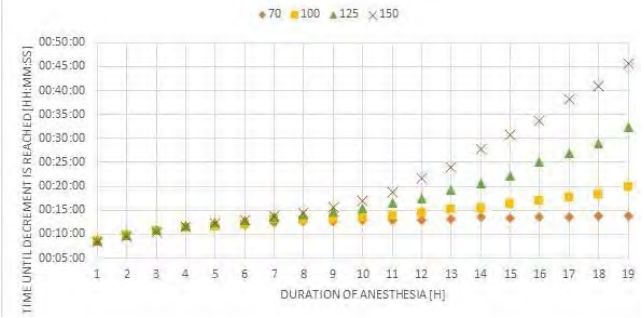
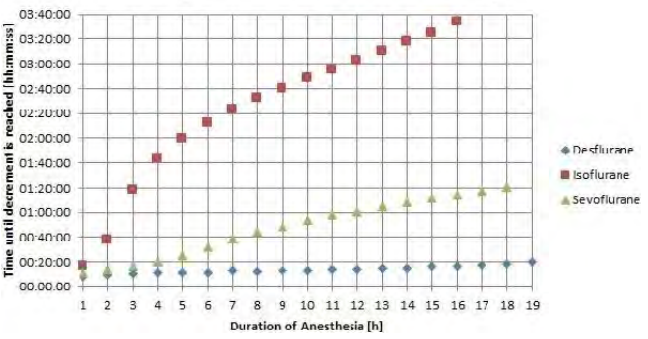
**Background:** Several clinical and theoretical predict that because of long retention and delayed liberation of volatile anesthetics from the excess fat tissue, obese patients have a slower emergence [1-3]. Primary aim of this study was to examine the effect of obesity and longer administration of desflurane, isoflurane and sevoflurane on the context-sensitive decrement-times.
**Methods:** The uptake, distribution and excretion of desflurane, isoflurane and sevoflurane were studied using the GasMan® computer simulation program. Four different simulation models with 70kg, 100kg, 125kg and 150kg were constructed. The 70kg patient had the standard distribution of flows and volumes as set in GasMan®. The 70kg patient was taken as lean and weights of 100, 125 and 150 kg were modeled by changing the cardiac output, vaporizer-settings, etc. and simulated. For each simulation model, the different decrement-times (67%, 90% and 95%-decrement), were measured from one to nineteen hours.
**Results and discussion:** The delay in recovery was significantly higher in the obese models (e.g. Fig. 1 and Fig. 2).




*[Fig. 1 (e.g.) 90%-decrement-times Desflurane]*




*[Fig. 2 (e.g.) Comparison 90%-decrement times 100kg]*

**Conclusion(s):** The effect of drug accumulation of inhaled anesthetics in obese patients has a big influence on the kinetics and the context sensitive decrement-times - especially in obese models and higher decrement-times. In particular the accumulation of desflurane, isoflurane and sevoflurane in obese models could have a significant impact on the emergence.

**References:**

1. Casati A et al. Effects of obesity on wash-in and wash-out kinetics of sevoflurane.
2. Torri G et al. Wash-in and wash-out curves of sevoflurane and isoflurane in morbidly obese patients.
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## 01AP13-6

### Prediction of significant obstructive sleep apnoea in the obese patient: development of the DX-OSA score

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**Background:** Obstructive sleep apnea is common in the morbidly obese. Anesthesiologists must be aware of the high prevalence of undiagnosed OSA In the obese surgical patient population who require anesthesia. Preoperative CPAP may reduce the postoperative pulmonary complications. The aim of this study was to identify to what extent anthropometric measurements can be used to predict the presence of significant OSA, defined as an Apnoea / Hypopnoea Index of 20 or greater.
**Methods:** With institutional Ethics Committee approval we prospectively studied 601 consecutive patients who were scheduled for laparoscopic bariatric surgery in our center, between January 2013 -December 2014. In addition to the routine recording of BMI, gender, diabetes, neck circumference, STOP BANG score, SpO2, we also measured neck fat, trunk fat, using Dual X-ray Absorptiometry (Lunar iDXA, GE Healthcare). The iDXA system allows subdivision into soft tissue into fat and fat-free (lean) compartments, which were recorded separately. The patients with a STOP BANG score>4 were investigated further with portable Polysomnography at home.
**Results:** 139 patients with apnea hypopnea index AHI >=20/h were considered to have moderate- significant OSA and received CPAP treatment. For each parameter of interest we constructed receiver operating curves in order to determine the sensitivity and specificity for diagnosing OSA.The cutoff points for each parameter were determined using de Youden Index and Matthew's Correlation Coefficient. The statistical analysis was performed with SPSS version 22..After examining the AUC's and cutoff points for each variable we then constructed a new score -DX-OSA Score which will include the following:
Cut off Points
STOP-BANG >4 1
Neck Circumference>42 cm 1
Baseline SpO2<95 1
Neck Fat>1.36 Kg 1
Trunk Fat >39.35 Kg 1
Expiratory Reserve Volume<56 1
The receiver operating curve underlines the performance of the DX-OSA Score. The cutoff value for the new score in diagnosing significant OSA is 3 points out of a maximum of 6, with a sensitivity of .91 and specificity of 0.90, and AUC=0.93.
**Conclusion:** The gold standard for OSA diagnosis polysomnography, is difficult to perform reliably. The CPAP pressure can be set without sleep study using the auto-titrated CPAP. A DX-OSA score >= 3 is a good predictor of moderate severe OSA which requires preoperative CPAP treatment and could replace the need for formal Polysomnography in a large proportion of Bariatric patients.

## 01AP13-7

### Complications after bariatric surgery occurring in the Post-Anesthesia Care Unit

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**Background and Goal of Study:** Postoperative adverse outcomes are common in morbidly obese patients undergoing bariatric surgery. The aim of this study is to identify and evaluate the immediate complications observed after bariatric procedures during the Post-Anesthesia Care Unit (PACU) stay.
**Materials and methods:** We performed prospective observational study in patients with morbid obesity (BMI ≥40,0 kg/m$^2$), aged 18 - 65, submitted to laparoscopic sleeve gastrectomy (LSG) or laparoscopic gastric bypass (LGB), from September 2015 to December 2015. We analysed the demographic characteristics, co-morbidities, postoperative complications during PACU stay and duration of PACU stay. Data was analysed with SPSS statistical software and T-test.
**Results and discussion:** 25 patients were included in the study, mostly women (n= 20), medium age 43 (+-17), ASA 3, BMI between 40,0-52,8 kg/m$^2$, who underwent LSG (n=10) or LGB (n=15). All did prophilaxis of gastric aspiration, venous thromboembolism and postoperative nausea and vomiting (PONV) according to Apfel score. Most frequent co-morbidities were: hypertension (44,0%), hyperlipidemia (24,0%), diabetes (20,0%), depression (20%), obstructive sleep apnea (16,0%) and asthma (16,0%). Immediate post-operative complications occurred in 76,0% of patients, mostly in men (M: 100,00%, F: 70,0%) and in patients with BMI <45 kg/m$^2$ (80,0% vs 60,0% with BMI > 45 kg/m$^2$). Immediate complications were: PONV (48,0%), moderate/severe pain (44,0%), respiratory failure (8,0%) and disorientation (8,0%). The average time spent in the PACU was longer in patients with complications (4h48min vs. 3h35min without complications) but the difference was not statistically significant (p>0,05). We also did not find a statistical correlation between the age or duration of the surgery and the occurrence of immediate complications. No severe complications like hemodynamic instability, arrhythmias, cardiovascular or thromboembolic events, cardiopulmonary arrest or death were observed during the study.
**Conclusions:** Patients submitted to bariatric laparoscopic procedures have high risk of developing PONV despite following recommendations based on *Apfel score* which could suggest different needs of this population regarding PONV prophylaxis. Morbidly obese patient is a challenge for the anesthesiologist and further studies should be performed in order to optimize the anesthetic management.

## 01AP13-8

### Bariatric surgery and hypnosis: A retrospective study

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**Background and Goal of Study:** Hypnosis as an adjuvant to general anaesthesia has not been thoroughly evaluated.
We used this technique routinely before induction of general anaesthesia for sleeve and bypass surgery. We set up a retrospective study comparing two groups of patients : one with hypnosis (HYPN) and a second group without (NHYPN). The goal of our study was to measure the post operative analgesics requirements.
**Materials and methods:** Our study received agreement from the local ethical committee.
The two groups of patients were anaesthetized according to an agreed protocole.
The hypnosis group of patients had a standardized hypnosis session (VAKO - Emergences School) prior to induction of anaesthesia.
Data were collected anaesthetic forms and computer notes. Data were collected between the 01/05/2015 and the 01/08/2015.
The HYPN and NHYPN were compared using the Khi2 test and the Student t-test 9 p<0.05).
**Results and discussion:** 110 patients were included. 6 cases were excluded for missing data. We studied 51 patients in the HYPN group and 53 patients in the NHYPN group. The HYPN and NHYPN groups did not show significative differences for the studied criteriae even though the demographic data were similar.

| | HYPN | | NHYPN | |
|---|---|---|---|---|
| N | 51 | | 53 | |
| | Mean (n) | SD (%) | Mean (n) | SD (%) |
| Recovery LOS (min) | 158,8 | +/- 127,2 | 138,83 | +/- 39,47 |
| Morphine usage : Recovery (mg) | 5,09 | | 7,09 | |
| Comfort arrival in recovery | 7,65 | +/- 2,38 | 7,15 | +/- 2,3 |
| Average Morphine usage in HDU (mg) | 9 | | 6,9 | |
| Comfort HDU 48H | 8,05 | +/- 0,97 | 8,04 | +/- 0,97 |
| Median total LOS hospital (D) | 5 | | 6 | |
| Severe complications | 3 | 5,88 % | 1 | 1,88 % |

*[Table of results: comparison of hypnosis versus no]*

**Conclusion(s):** Our method allows for studying the effect of hypnosis when used in large surgery for the adult patients. A prospective study could be considered. The absence of significative difference between the 2 groups leads to a necessary discussion about the standardized care pathway and its duration. A larger cohort of patients would allow us to discriminate for sub-groups of patients who would benefit from hypnosis in synergy with a general anaesthetic technique. More specific markers must be defined to evaluate a possible benefit for hypnosis. Patient satisfaction must be included in our critaerie.

## 01AP13-9

### Long-axis real-time ultrasound-guided peripheral venous access in overweight patients might be effective choice

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**Background and Goal of Study:** Ultrasound-guided (UG) cannulation of the internal jugular vein has become a standard practice over recent years. There are some studies that UG increased success rate of peripheral venous placement in difficult peripheral venous access (PVA) compared with traditional technique.1) The objective of this study was to determine that UG PVA is useful for obesity patients (BMI>30).
**Materials and methods:** This was a prospective and observational study. 8 obesity patients (BMI more than 30) who underwent surgical operation in need PVA between September and December 2015.After avascularization, venous was visualized in long axis view (in-plane), then cannulation needle was placed during real-time UG. We count Time between avascularizaiton and release and Number of punctures.
**Results:** The mean number of punctures was 1.125±0.353. The median of punctures was 1.
The mean time to cannulation was 211±103.0 seconds. The median of time was 288 seconds.
Any patient had no complication (infection, damage nerve etc)
**Discussion:** Many studies said that real-time US is improve success rate for patients with difficult PVA. (1-4 In many study venous is visualize in short-axis (transverse) ultrasound view. If the vessel is visualized in long-axis, we can observe the cannulation needle inserting the vessel in real time. Thanks to long-axis view, it might have archived the higher success rate and shorter time to cannulation than other studies. It's a technical study, so it isn't possible to compare with other studies and a traditional techniques, but we think Long-axis real-time UG PVA is very useful technique.
When obesity patients need to be PVA, Real-time UG PVA technique may be chosen from the first time.
**Conclusion(s):** Long-axis UG PVA archived high success rate and short time to cannulation in obesity patients.
**References:**
1. Stolz LA. Ultrasound-guided peripheral venous access: a meta-analysis and systematic review.J Vasc Access. 2015 Jul-Aug;16(4):321-6.
2. Aponte H.,T. The use of ultrasound for placement of intravenous catheters. *AANA J* 2007; 75: 212-216
3. Costantino TG. Ultrasonography-guided peripheral intravenous access versus traditional approaches in patients with difficult intravenous access. *Ann Emerg Med* 2005; 46: 456-461
4. Doniger SJ.,Randomized controlled trial of ultrasound-guided peripheral intravenous catheter placement versus traditional techniques in difficult-access pediatric patients. *Pediatr Emerg Care* 2009; 25: 154-159

## 01AP13-10

### Lessons learned from the anesthetic management of patients with narcolepsy

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**Background:** Narcolepsy is a neurological disorder that affects sleep regulation and is associated with increased risk of perioperative complications. The aim of this study is to systematically review the literature concerning the anesthetic management of patients with narcolepsy.
**Materials and methods:** A search was conducted in the Medline database. The parameters analyzed were: anesthetic induction, anesthetic maintainence, premedication, withdrawal of medication for narcolepsy, use of depth of anesthesia monitors, time for extubation and perioperative complications.
**Results and discussion:** Nineteen case reports and one review were included.
Prolonged emergence, sleep paralysis, apneic episodes and hypnagogic/hypnopompic hallucinations were reported in 4 narcoleptic patients after inhalational anesthesia. However, 6 reports of uneventful inhalational anesthesias were also found. Concerning intravenous anesthesia for narcoleptic patients,
4 case reports were found, showing no complications. A case series of 10 narcoleptic patients who underwent 27 surgeries showed that time for extubation did not differ from that observed in age and procedure match controls, during the same period.
Regional anesthesia may be an attractive option, however, narcolepsy-cataplexy episodes have been reported in narcoleptic patients undergoing surgery under spinal anesthesia and under femoral nerve block. We found 2 case reports of epidural blocks and 1 case of an axillary brachial plexus block, with no complications.
We did not find any clinical trials. The only review article found was written prior to the publishment of almost all case reports.
Depth of anesthesia monitors were used in less than half of the patients. BIS or entropy monitoring can be important to optimize anesthetic administration and to monitor a possible narcoleptic episode.
Benzodiazepines were administered preoperatively in four cases. Two of the patients had narcoleptic events intra ou post-operatively. The two other had no complications.
In the majority of cases, the patient's usual medication for narcolepsy was continued on the day of surgery, which may have contributed to a more rapid and complete recovery of consciousness.
**Conclusions:** Avoidance of sedative premedication, continuation of medication for narcolepsy on the day of surgery, use of short-acting anesthetic agents and depth of anesthesia monitoring may be beneficial measures in the management of narcoleptic patients.

## 01AP13-11

### NICOM® hemodynamic monitoring: what happens to obese patients during laparoscopy?

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**Background and Goal of Study:** Comorbidities of obese patient result in an increased risk of morbidity and/or mortality. During laparascopy, pneumoperitoneum (PM) is essential and determines systemic variations. An increase in systemic vascular resistance (SVR) has been described together with an increase of the intra-abdominal pressure (IAP). The effects of a increase intrabdominal pressure are the reduction of venous return and reduction in myocardial performance. At intra-abdominal pressure<10 mmHg corresponds an increase in venous return due to a decrease of splanchnic blood flow, resulting in increased cardiac output (CO) and mean arterial pressure (MAP). However to one intra-abdominal pressure> 20 mmHg venous return decreases with a consequent decrease in cardiac output. Significant increase in stroke volume (SV), cardiac output (CO) and cardiac index (CI) during pneumoperitoneum for intra-abdominal pressure of 15 mmHg is shown. Non-invasive hemodynamic monitoring (NICOM®) has become a standardized method.
Aim of our study was to show the hemodynamic changes that occur during interventions in videolaparoscopy obese patients.

**Materials and methods:** After EC approval and explicit informed consent 45 obese (BMI>30) patients (31 women and 14 men) who underwent laparoscopy, general and gynecological procedures, were included. ASA II-III, mean age 30 +/- 10 years, weight 110 +/- 15 +/- 10 kg and height 160 cm. BMI was 45 +/- 10 (range 35-55). Preoperatively all patients underwent standard blood tests, chest X-ray, ECG, arterial blood gas analysis on room air and spirometry. During surgery the patients were monitored with NICOM and a pulse oximeter. Intra-abdominal pressure was never > 15 mmHg. Three surgical phases were considered: before PM, during and after termination of PM. the evaluation of CO, NIBP, MAP, HR, CI and SaO2, allowed to calculate the DO2I. For all comparative data only ones $p<0.05$ were considered significant.
**Results and discussion:** Mean arterial pressure, heart rate and cardiac output during the pneumoperitoneum compared to the previous phase of induction was significant ($p<0.05$). With the resolution of the pneumoperitoneum these values returned to values similar to those of the initial phase.
**Reference:**
Marque S, Cariou A, Chiche JD, et al. Comparison between Flotrac-Vigileo, and Bioreactance, a totally non invasive method for cardiac output monitoring. Critic.Care 2009; 13(3)

## 01AP14-1

### Efficacy of ramosetron in preventing postoperative nausea and vomiting: an updated meta-analysis with trial sequential analysis

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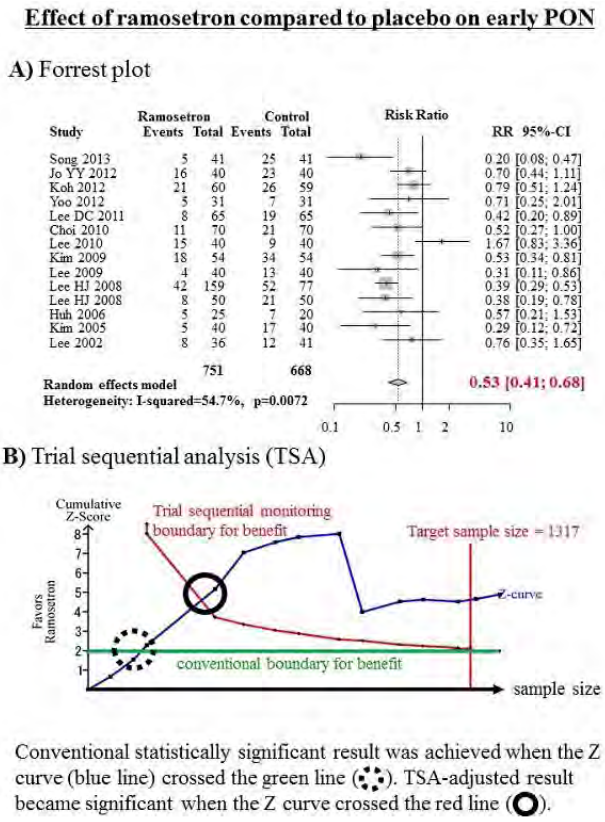
**Background:** In 2013, we reported a meta-analysis on the efficacy of ramosetron in preventing postoperative nausea and vomiting (PONV). After that, several randomized controlled trials (RCTs) on the effects of ramosetron have been published. When updating a meta-analysis, the use of trial sequential analysis (TSA) is recommended. TSA adjusts the P value and 95% confidence interval (CI) to prevent the inflation of type I error rate because of viewing of the evidence multiple times. The aim of this study was to update the meta-analysis by using TSA.
**Methods:** We searched MEDLINE, CENTRAL, Embase, and Web of Science. RCTs that reported the efficacy of ramosetron, compared with that of placebo, in preventing PONV were included.
We defined postoperative 0-6 and 6-24 hours as early and late periods, respectively. We collected and analysed the data on postoperative nausea (PON) and vomiting (POV) separately. We used the random-effects model to combine the data. In the TSA, risk of type 1 error was maintained at 5% with a power of 80%, and TSA-adjusted P values and CIs were calculated.
Heterogeneity was quantified using I2 statistics. Publication bias was evaluated using funnel plot. A sensitivity analysis restricted to double-blind RCTs was conducted.
**Results:** Of the 352 articles initially searched, 20 articles (2003 patients) were included in the study. A conventional random-effects meta-analysis showed that ramosetron was more effective than placebo in preventing PON and POV during both the early and late periods (PON early: risk ratio (RR) [95% confidence interval] = 0.53 [0.41-0.68] (Figure 1A), PON late: 0.47 [0.34-0.66], POV early: 0.49 [0.32-0.74], and POV late: 0.50 [0.36-0.69]). The sensitivity analysis did not change the results.
Additionally, the Z curve crossed the TSA monitoring boundary (Figure 1B), which means that the TSA-adjusted 95% CI did not include the value of 1, in all results.
**Conclusion:** Ramosetron is more effective than placebo in preventing PONV. TSA suggests that the effect of ramosetron appears to be strong enough to draw a reasonable conclusion and there is no need to conduct RCTs for comparing ramosetron with placebo.




*[Figure1]*

## 01AP14-2

### A randomized double blind study evaluating the effect of opioid free versus opioid anesthesia on postoperative pain and discomfort in 50 laparoscopic bariatric surgery patients

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**Background:** This study compares total opioid free anesthesia (OFA) with opioid anesthesia (OA) for bariatric surgery. OFA might require less opioids post operative and the quality of recovery measured by Qo40 as described by Miles might have improved.
**Methods:** The institutional ethics committee approved the study. 50 Patients are randomly assigned to OFA or OA. Anesthesia is induced in both groups by propofol 2 mg/kg TBW and rocuronium 1 mg/kg IBW. The OA group gets at induction Sufentanyl 0,5 ug/kg IBW while the OFA group gets a loading dose of Dexmedetomidine 0,5 ug/kg IBW, Ketamine 0,25 mg/kg IBW and Lidocaine 1,5 mg/kg IBW.
The bispectral index is maintained in both groups between 40 and 60% by adapting the end tidal sevoflurane concentration. Continuous Deep NMB with rocuronium is achieved by a rocuronium infusion in both groups to keep TOF at zero and PTC around 4.
The anesthesia is further maintained in the opioid group with Sufentanyl between 0,25 and 1 ug/kg IBW/h. The opioid free group gets lidocaine 1,5 - 3 mg/kg/h and Dexmedetomidine between 0,5 - 1 ug/kg/h.
Postoperative analgesia is achieved in both groups with Paracetamol 2 gr loading during surgery followed by 1 gr every 6 h and with PCIA at 2 mg morphine bolus on demand.
Kalkman and APAIS scores are measured before anesthesia. Qo40, VAS pain score, morphine consumption and cortisol are measured post operative.
**Results:** There were no demographic differences between the two groups with regard to age, weight, length, BMI, gender, the desire to get information, the incidence of pre operative OSAS, the pre operative information desire,

combined anxiety score and number of Kalkman points. No differences were found peroperative in the number of patients having had one or more hemodynamic problems, like bradycardia, hypotension, tachycardia or hypertension defined as a change of 20 %. Anxiety and Kalkman points had no impact. The postoperative saturation with oxygen mask at the PACU was lower in the OA with a higher incidence of obstructive breathing, PONV, shivering or complaining of having cold, higher VAS score and total morphine consumption. The next morning Q040 scores in OFA patients were higher and cortisol levels were lower.

**Conclusion:** OFA Patients needs less opioids on the day of surgery and the quality of recovery improves in the PACU and on the first post operative day.

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## 01AP14-3

### Depth of anaesthesia predicts post-operative pain at six weeks following wide local breast tissue excision and sentinel node biopsy

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**Background and Goal of Study:** There is controversy about the impact of depth of anaesthesia on post-operative outcomes[1]. We tested the hypothesis that episodes of light anaesthesia may give rise to pain sensitisation and elevated levels of post-operative pain.

**Material and methods:** 60 women (ASA 1 & 2) undergoing wide local excision of breast tissue and sentinel node biopsy took part in the study. All received a Propofol induction and Sevoflurane (between 1 and 1.5 MAC) in 50% nitrous oxide maintenance along with Atracurium. Depth of anaesthesia was monitored using BIS (Covidien Vista). The anaesthetist delivering the anaesthetic was blind to the BIS index. The anaesthetist was told that the patient was light if the BIS exceeded 55, and deep if it fell below 30. BIS was recorded each minute following induction to completion of suturing.

Patients were followed up at 3 days, 6 weeks and 3 months using the McGill pain questionnaire, a visual analogue pain scale and a present pain intensity Likert scale.

**Results and discussion:** Significant correlations were found between (1) the BIS post induction, (2) during the 5-minute epoch following initial incision, and pain measures at 6 weeks ($r=0.43$, $p=0.002$; $r=0.285$, $p=0.039$), but not at the other two time points.

The patient sample was divided at a BIS of 50 creating deep and light groups. An independent t-test demonstrated significant differences between these on Present Pain Intensity ($t=2.42$, $p=0.019$) and approaching significance on the McGill Pain Questionnaire ($t=1.90$, $p=0.063$) and on the VAS ($t=1.83$, $p=0.073$) at 6 weeks.

This supports the hypothesis that light anaesthesia may allow sensitisation to pain at 6 weeks. Why no relationship at 2 days or at 3 months? At 2 days, biological variables predominate in influencing pain perception, including analgesic dose, so psychological influences were masked. At 3 months most patients were pain-free, leaving no scope for significant correlation.

**Conclusion:** We found a positive relationship between anaesthetic lightness and post-operative pain at 6 weeks following breast surgery.

The findings suggest that depth of anaesthesia monitoring and responsive adjustment of anaesthetic dose may reduce post-operative pain. They support the theory that intra-operative events may be processed by the patient under light anaesthesia and have post-operative effects despite explicit amnesia.

**Reference:**

1. Monk, T. Anesthetic depth is a predictor of mortality. *Anesthesiology* 2010; *112*:1070-2

## 01AP14-4

### Does intraoperative opioid influences postoperative opioid requirement? A retrospective observational study in 202 patients submitted to bariatric surgery

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**Background and Goal of Study:** Anaesthesiologist's armamentarium is nowadays importantly enriched by opioids with different pharmacologic properties. This diversity allows the anaesthesiologist to adapt its practice to the characteristics of each patient.

The aim of this study was to evaluate whether the type of opioid used in the intraoperative period has any impact on opioid requirement during the early postoperative period following bariatric surgery.

**Materials and methods:** After approval by the institutional review board, clinical records of 393 patients submitted to gastric bypass surgery from January 2010 to May 2015 in a tertiary hospital were audited. Age, gender, American Society of Anaesthesiology (ASA) Physical Status Classification, weight, height, Obesity Surgery Mortality Risk Score (OS-MRS) and surgery time were collected. Intraoperative and early postoperative (Post Anaesthesia Unit Care - PACU) analgesic drugs were obtained. Included patients were divided into three groups according to the intraoperative administered opioid: fentanyl (FG), remifentanyl (RG) and Fentanyl+Remifentanyl (FRG). Postoperative analgesic protocol included acetaminophen 1000mg, tramadol 200mg and either parecoxib 40mg or ketorolac 30mg in the end of surgery.

Postoperative opioid dose was converted to morphine equivalents and analysed according to used intraoperative opioid. Statistical analysis was performed using two-way ANOVA and Tukey *post-hoc* tests with SPSS® version 23. Statistical significance was considered at $p<0.05$.

**Results and discussion:** A total of 202 (83.8% female) patients were included (64 FG, 99 RG and 39 FRG). Average age - 43.22 years old (±10.75); Body Mass Index - 44.13 Kg/m$^2$ (±6.30); duration of surgery - 131.49 minutes (±39.38). ASA 2 - 20.6%; ASA 3 - 77.5%. OS-MRS Class A - 84; class B - 100; Class C - 18. Postoperative opioid requirement: FG - 0.028 mg/Kg (±0.034); RG - 0.052 mg/Kg (±0.037); FRG - 0.040 mg/Kg (±0.039). This difference was significant when comparing F group with R group ($p<0.001$).

**Conclusion(s):** In our sample, the use of intraoperative remifentanyl, when compared to fentanyl, was related to an increase in the amount of opioid requirement in the PACU. There was no significant difference between RG and FRG and between FG and FRG. Although the pharmacokinetics of remifentanyl is an advantage in these patients, one should consider the higher opioid requirement in the postoperative period.

## 01AP14-5

### Breast augmentation: minimizing postoperative nausea and vomiting: a prospective study

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**Background and Goal of Study:** The plastic surgery procedure associated with the greatest risk of Postoperative Nausea and Vomiting(PONV) is breast augmentation (eight to ten times higher than other types of plastic surgery). No single agent has been proven completely effective against all cases of PONV. The purpose of this study is to evaluate the efficacy of a specific antiemetic protocol that the plastic surgery service applied in breast augmentation operations.

**Materials and methods:** 247 patients who underwent breast augmentation with silicone implants from October 2010 to October 2014 were enrolled in the study. Using standard monitoring general anesthesia was induced with propofol(2mg/kg), fentanyl (2mcg/kg) and rocuronium(0.7mg/kg). Anesthetic maintenance was accomplished with total intravenous anesthesia (propofol 4-10 mg/kg/h, remifentanil 0.25 mcg/kg/min) and nitrous oxide with oxygen at 50%.All patients received metoclopramide 10 mg intravenously at the induction and 8mg of ondasetron iv(2 mg at the induction and 6 mg over 30 minutes). In high risk patients dexamethasone 8mg was administrated at the induction. Intergroup comparison of means was performed using unpaired *t*

## 01AP14-9

### Antiemetic efficasy of TIVA and droperidol in laparoscopic cholecystectomy

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**Background and Goal of Study:** Postoperative nausea and vomiting (PONV) is one of the most common complications of general anesthesia for laparoscopic cholecystectomy. Different antiemetic agents are used to reduce the incidence of PONV. The study compares whether the combination of antiemetic measures (TIVA + DHBP) reduces the incidence of PONV in the first 24 hours after surgery.
**Materials and methods:** The study included 61 patients (ASA I and ASA II) aged 18-70 years. Patients were anesthetized with propofol total intravenous anesthesia (TIVA) and randomly divided into two groups - TIVA (group T, n = 31) and TIVA + DHBP (group TD, n = 30). In TD group droperidol was administered in dose of 0.625 mg. The incidence of PONV was followed by the first 24 hours after surgery.
**Results and discussion:** Twenty three (37%) patients included in the study had PONV, 13 (41%) in group T and 10 (33%) in group TD. Using Pearson's chi-square test with Yeats correction ($\chi 2 = 0.18388$, $p = 0.6681$), it was found that the differences between the two groups were not statistically significant. The incidence of PONV by intervals were 32.3% in T group and 20% in TD group in the first hour after surgery, 29% and 23.3% in 1-6h interval, and 19.4% and 23.4% in 6-24h interval after surgery. Statistically significant differences in the incidence of PONV among intervals have not been found ($p = 0.43$, $p = 0.83$, $p = 0.95$).
**Conclusion(s):** TIVA with propofol significantly reduces the incidence of postoperative nausea and vomiting as compared to other techniques in general anesthesia. According to the results of our study, droperidol combined with TIVA shows no further reduction of incidence of PONV after laparoscopic cholecystectomy.

## 01AP14-10

### Comparing analgesic requirements after a non-opiate anesthesia and an opiate anesthesia in breast cancer patients: a prospective randomized, double-blinded, controlled trial

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**Background and Goal of Study:** Opioids provide an excellent analgesic effect peri-operatively, however, like every drug, not without side-effects. Post-operative complications, such as respiratory depression, post-operative nausea and vomiting, pruritus, difficulty voiding and ileus are well known.
In this study, analgesic requirement was examined after patients received opiate anesthesia and non-opiate anesthesia.
**Materials and methods:** A randomized controlled trial containing two groups with each 33 breast cancer patients undergoing a mastectomy or lumpectomy associated with a total axillary dissection was conducted between 29/09/2014 and 09/07/2015 at the Jules Bordet Institute, Brussels.
Per-operative non-opiate analgesia was obtained by combining clonidine (0.2 mcg/kg), ketamine (0.3 mg/kg) and lidocaine (1.5 mg/kg). An extra bolus of ketamine (0.2mg/kg) was given if necessary.
Opiate analgesia was obtained via a combination of remifentanil TCI, ketamine (0.3 mg/kg) and lidocaine (1.5 mg/kg).
Both groups received IV paracetamol (1000mg/6h) and IV diclofenac (75mg/12h).
Patients received a PCA (patient-controlled analgesia) pump for breakthrough pain during the first 24 hours post-operatively.
Clinical characteristics and post-operative piritramide consumption were assessed during the first 24 hours post-operatively.
Non parametric Wilcoxon test was used to compare postoperative piritramide consumption.
**Results and discussion:** Data were lacking for two patients in the non-opiate group. A total of 64 patients were included in the study. The total piritramide usage 24 hours post-operatively was 8.1 (2.0-14.5) mg in the non-opiate group and 13.1 (6.0-16.0) mg in the opioid group. The difference observed was statistically significant. ($P<0.05$) Thus, these values show that patients in the non-opiate group require less analgesics.
**Conclusion(s):** Non-opiate anesthesia is safe in breast cancer surgery. Patients require less analgesics 24 hours after a non-opiate anesthesia than after an opiate anesthesia.

## 01AP14-11

### Pre-anesthetic administration of single-dose dexmedetomidine does not reduce postoperative fentanyl demand after gynecological laparotomy

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**Background and Goal of Study:** This prospective, randomized, double-blind, controlled study was designed to assess whether pre-anesthetic administration of dexmedetomidine reduce postoperative opioid consumption in patients receiving patient-controlled fentanyl after gynecological laparotomy.
**Materials and methods:** After approval of IRB and written informed consent, thirty-four patients scheduled for elective gynecological laparotomy were randomly assigned to receive normal saline (group N) or dexmedetomidine 1 $\mu$g/kg (group D) 10 min before induction of anesthesia. Patients used a patient-controlled analgesia (PCA) device to receive fentanyl for postoperative 24 hours. We recorded total cumulative fentanyl consumption, VAS for pain and the use of rescue analgesic drug at 30 m, 6 h and 24 h after start of PCA. Patient's satisfaction for pain control, other side effect (nausea, thirsty, sedation score) were recorded for corresponding time.
**Results and discussion:** There were no significant differences between groups in cumulative fentanyl consumption, pain score, and usage of additional analgesic drug (Table 1). The incidence of side-effects did not differ between the groups. Both group show similar SBP and DBP after anesthesia induction, whereas HR in group D showed significant lower than group N at 10 min after anesthesia induction ($P=0.0002$).

| | | Group N (n=18) | Group D (n=16) | P-value |
|---|---|---|---|---|
| Fentanyl dose (ug/kg) | 30 min | 0.78±0.49 | 0.80±0.28 | 0.902 |
| | 6 hrs | 3.73±1.21 | 3.27±1.10 | 0.255 |
| | 24 hrs | 6.58±2.58 | 6.26±2.29 | 0.710 |
| | Total | 11.10±3.21 | 10.34±2.93 | 0.477 |
| VAS for pain (100 mm) | 24 hrs | 40 (20-62) | 35 (10-58) | 0.315 |
| Usage of additional drug | | 8 | 6 | 0.681 (Odds 1.32) |
| Satisfaction for pain control | | 7 (3-10) | 7 (4.25-9) | 0.958 |

*[Results of primary outcomes]*

All data are expressed as mean±SD or number of patient or median ($5^{th}$ and $95^{th}$ percentile).

**Conclusion(s):** Administration of single dose dexmedetomidine (1 $\mu$g/ kg) given 10 min before anesthesia induction does not reduce postoperative fentanyl consumption of PCA and pain score in patient undertaken gynecological laparotomy.
**Reference:**
Unlugenc H, Gunduz M, Guler T, Yagmur O, Isik G. The effect of pre-anaesthetic administration of intravenous dexmedetomidine on postoperative pain in patients receiving patient-controlled morphine. Eur J Anaesthesiol 2005;22:386-91.

## 01AP14-12

### Comparison of opioid free anaesthesia with opioid anesthesia on postoperative shivering in morbidly obese patients scheduled for bariatric surgery

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**Introduction:** Post-anaesthetic shivering (PAS) occurs frequently. The primary cause is believed to be peri-operative hypothermia caused by anaesthetic induced vasodilatation and inhibition of thermoregulation while exposed to a cold environment. Research has shown that several drugs including the opioids meperidine and tramadol, clondine, dexmedetomidine, ondansetron and ketamine treat and prevent shivering by reducing the shivering threshold temperature. In addition, several studies concluded that patients had significant less shivering and less discomfort of feeling cold when given opioid free anaesthesia. This trial tries to verify whether opioid free anaesthesia (OFA) has a significant impact on loss in core temperature and subsequent shivering, as compared to opioid anaesthesia (OA).
**Method:** 50 patients undergoing bariatric surgery were randomly assigned to either the OFA group (n=25) or the OA group (n=25). Core body temperature was registered with the Spot On system with an interval of 15 minutes. The period and intensity of shivering was documented by specified members in the recovery room.
**Results:** No differences were observed between OFA and OA in terms of mean temperature decrease (temperature pre-induction minus temperature extubation divided by length of procedure -T-test - equal variances: $p>0.05$). However differences were seen in the occurrence of post-operative shivering. In the OA group 12 out of 25 patients shivered, as compared to 1 out of 25 in the OFA group. Binary logistic regression showed opioid-use as a predictor of shivering ($p=0.005$). The odds ratio of shivering in the OA group was 22.154. Other variables, as the mean core body temperature decrease, length of procedure, age and weight did not have an influence on PAS ($p>0.05$) .
**Conclusion:** A significant ($p<0,005$) difference in post-anaesthetic shivering was found between OFA and OA groups (1/25 versus 12/25 resp), which could not be related to the intra- and peri-operative drop in core body temperature. No other variables were statistically linked to provoke shivering in this study.

## 01AP15-1

### The effect of intravenous s-ketamine on the MAC of sevoflurane, preliminary results

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**Background and Goal of Study**: S-Ketamine is commonly used to reduce opioid consumption during general anaesthesia. Ketamine also reduces the minimum alveolar concentration (MAC) of volatile anaesthetics in animals.[1] However, it is not yet determined, if this is also the case in humans. Alterations of MAC are of major importance and must be considered by clinicians providing inhalational anaesthesia. Therefore, we investigated the effect of different doses of S-ketamine on the MAC of sevoflurane in humans.
**Materials and methods:** So far, we included 30 adult ASA 1-3 patients aged 30-65 years who received general anaesthesia for elective surgery with a skin incision of at least 3cm at the trunk. We induced anaesthesia with the multiple deep breath inhalational technique with 8% sevoflurane in oxygen. We inserted a laryngeal mask airway, decreased the sevoflurane concentration to a predefined level and held it constant for at least 15 minutes. At the same time, we administered a bolus dose of either s-ketamine 1 mg $kg^{-1}$ (high dose ketamine group) or s-ketamine 0.5 mg $kg^{-1}$ (low dose ketamine group) or placebo (0.9% saline, placebo group), followed by a continuous infusion of the same amount per hour. An independent examiner observed patient's reaction to skin incision (movement vs. no-movement) and we calculated the MAC of sevoflurane in each group using Dixon's up and Down titration method. In addition, we recorded the Bispectralindex (BIS) and the occurrence of adverse events such as hallucinations or signs of intraoperative awareness postoperatively in the recovery area.
**Results and discussion:** Based on our preliminary results, ketamine reduces the MAC of sevoflurane compared to placebo. The MAC in the high dose ketamine group was 0.5% sevoflurane, in the low dose ketamine group the MAC was 1.1% and in the placebo group it was 2.0 % . The BIS at skin incision was higher in the ketamine groups (high dose ketamine group mean BIS 76, low dose ketamine group 77) compared to the placebo group (mean BIS 44). No adverse events were recorded.
**Conclusion:** Our study demonstrates that s-ketamine, given in clinically used doses, decreases the MAC of sevoflurane whereas it increases the BIS. The optimal parameter for guidance of anaesthetic depth for sevoflurane anaesthesia in combination with s-ketamine needs further investigation.
**Reference:**
1. Laskowski K et al. A systematic Review of intravenousketamine for postoperative analgesia. Can J Anaesth 2011 58 (10); 911-23

## 01AP15-2

### Wash-in and wash-out times required to reach the target concentration of sevoflurane in a lung model: according to anesthetic machines (Primus®, Perseus® and Zeus®) and fresh gas flow

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**Background and Goal of Study:** To compare wash-in and wash-out times that were required to reach target concentrations of sevoflurane according to type of anesthesia machines (AM) and fresh gas flow rate (FGF) in a lung model.
**Materials and methods:** Sevoflurane wash-in and wash-out times were measured on 3 AMs [Primus®, Perseus®, or Zeus®(F, fresh gas mode)] using 3 FGF (0.5-, 1-, or 3-L/min), and Zeus®(A, auto-mode) with 100% $O_2$. AMs were connected to Test lung®, and sevoflurane was set at a 6% vaporizer setting in the Primus®, Perseus®, and Zeus®(F) or at a target end-tidal setting of 4.0% in the Zeus®(A) with mechanical ventilation. Time to reach 4% sevoflurane concentration was measured during wash-in from 0% to 6% [Primus®, Perseus®, Zeus®(F)] or 4% [Zeus®(A)]. Time to reach 1% sevoflurane concentration was measured during wash-out from 4% to 0%.
**Results and discussion:** With different FGF rates in same type of AM, wash-in and wash-out times shortened with the increasing FGF rates ($P<0.05$). Wash-in and wash-out times was shorter in the order of Perseus®, Primus®, and Zeus®(F) in all FGF groups ($P<0.05$) excepted for wash-out time using 0.5-L/min for which order was Perseus®, Zeus®(F) and Primus® ($P<0.05$). For both Zeus® modes, wash-in time in Zeus®(A) was shorter in FGF rate 0.5- and 1-L/min groups of Zeus®(F), but longer in FGF rate 3-L/min group of Zeus®(F) ($P<0.05$). Wash-out time in Zeus®(A) was shorter than that of Zeus®(F) in all of FGF groups ($P<0.05$).
**Conclusion(s):** Rapid changes of target sevoflurane concentration were associated with high FGF rate, use of blower-driven ventilator, small internal breathing volume, absence of a decoupling system, and proximal fresh gas inlet to patient of AM.
**References;**
1. Kern D, Larcher C, Basset B, Alacoque X, et al. Inside anesthesia breathing circuits: time to reach a set sevoflurane concentration in toddlers and newborns: simulation using a test lung. Anesth Analg. 2012; 115: 310-4.
2. Struys MM, Kalmar AF, De Baerdemaeker LE, et al. Time course of inhaled anaesthetic drug delivery using a new multifunctional closed-circuit anaesthesia ventilator. In vitro comparison with a classical anaesthesia machine. Br J Anaesth. 2005; 94: 306-17.

## 01AP15-3

### Effect of sevoflurane versus desflurane in lung function tests in patients undergoing abdominal wall surgery under regional anesthesia and sedation with spontaneous ventilation through laryngeal mask

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**Background and Goal of Study:** Desflurane increases airway resistance during mechanical ventilation compared to sevoflurane. There are no studies comparing the effect of sevoflurane and desflurane in lung function tests after surgery. The main objective of the present study was to compare the differences between both agents in lung function, evaluating the difference between forced expiratory value in the first second ($FEV_1$), measured at baseline and 30 minutes after surgery for abdominal wall surgery under regional anesthesia and sedation LMA with spontaneous ventilation.
**Materials and methods:** Forty two patients were included in this observational study. After arriving to the operating room, a basal spirometry was performed. A dose of propofol (1.5-2 mg/ kg) was administered and a LMA was inserted. After recovering spontaneous ventilation, sevoflurane or desflurane were administered at 0.5-1 MAC. After, an ultrasound-guided regional block was performed: an ilioinguinal and hiliohipogastric block for inguinal hernias, an a block of the rectus sheath for umbilical hernias. Use of neuromuscular blockers or a dose of fentanyl over 2μg/kg were exclusion criteria.
A new spirometry was performed 30 and 120 minutes after surgery. Differences between basal FVC, FEV1, FEV1/FVC and FEF 25-75%. and 30 and 120 minutes after surgery were compared in the sevorane and the desflurane group. Time until recovery after sevorane or desflurane interruption was also compared.
Statistical analysis was performed with student`s t, ANOVA, or Mann Whitney test, when appropriate.
**Results and discussion:** 21 patients received sevorane and 21 desflurane. Basal characteristics were similar in both groups. Sevoflurane showed significantly better values in FEV1/CVF values at 30 and 120 minutes postoperatively and in the decrease of FEF 25-75% at 120 minutes after surgery . These differences were 2.8%, 5.2%, and 13.2%, respectively.
Time until recovery was significantly lower in the desflurane group (mean 5 min vs 10 min).
**Conclusion(s):** The present results suggest a probable broncoconstrictor effect of desflurane compared with sevorane, that remains in the first hours of the postoperative period . Further studies in susceptible population like patients with bronchial reactivity disease or severe obstructive pulmonary disorders should be developed.
**References:**
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2. Kim YS; et al. Acta Anaesthesiol Scand 2015; 59: 788-795

## 01AP15-4

### Quantifying volatile agent waste by analyzing excess fresh gas flow

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**Background:** In a climate of cost containment, it is critical to analyze and optimize all perioperative variable costs. Fresh gas flow is one important variable that determines utilization of volatile agents and can be tightly controlled by the anesthesia provider. Manufacturers of inhalational agents have recommendations for minimum gas flow for their respective agents. Any gas flow above these recommendations is considered misuse and leads to unnecessary expense. The purpose of this study was to characterize and quantify the excess use of inhalational agents by analyzing fresh gas flow rates for long duration cases.
**Methods:** Over a span of three months, operating room records were analyzed for all procedures lasting greater than 4 hours. End tidal inhalation agent percentage for Sevoflurane and Isoflurane and fresh gas flows were analyzed. 303 unique patients with at least 4 hours of anesthesia time were included. Analysis excluded the first and last 30 minutes of all anesthetics to account for need for higher gas flows during induction/emergence of anesthesia. 152 patients received sevoflurane alone. 33 patients received isoflurane alone. 107 patients received both isoflurane and sevoflurane and were included in sevoflurane group given the higher gas flow needs of sevoflurane. 11 patients received neither agent and were excluded from analysis. We proceed with n=292 unique patients. (259 in Sevo, 33 in iso) We used the two-sided one sample t-test setting 2ml/min as the null for sevo and 1ml/min as the null for iso; we ran analysis using a nonparametric test that didn't require the fresh gas flow to be normally distributed-- the two-sided one-sample Wilcoxon rank-sum test: p=value<0.0001.
**Results:** The results of our study revealed a sevoflurane (n=259) mean fresh gas flow (l/min) 2.55 (95%CI, 2.45-2.66)--significantly different from null of 2ml/min:p<0.0001. Isoflurane (n=33) mean fresh gas flows (l/min) 2.33 (95%CI, 2.00-2.66)--significantly different from null of 1l/min:p<0.0001.
**Discussion:** Pursuant to manufacturer recommendations, the anesthesia providers delivered fresh gas flows at least 28% higher than necessary for sevoflurane and at least 130% greater than necessary for isoflurane anesthetics. This is an area where cost reduction can be readily achieved. Future plans to realize a reduction in inhalational agent utilization include
(1) education of the benefits of diminishing fresh gas flows and
(2) instituting a low fresh gas flow policy.

## 01AP15-5

### Effect of $N_2O$ and wash-in rates on desflurane usage during automated gas control (AGC) with the FLOW-i

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**Introduction:** AGC®, the FLOW-i's automated low flow system (Maquet, Solna, Sweden), exponentially decreases fresh gas flow (FGF) to 300 mL/min; it also offers a choice of speeds to wash-in the inhaled agent (1). We hypothesized $N_2O$ use or a lower speed reduces desflurane usage (Vdes).
**Methods:** After obtaining IRB approval and patient (pt) consent, 84 ASA I -II patients undergoing abdominal surgery were randomly assigned to 1 of 6 groups (n=14 each), depending on carrier gas ($O_2$/air or $O_2/N_2O$) and speed (2, 4 or 6) to attain the end-expired desflurane target % (FAtdes), resulting in groups Air2, Air4, Air6, $N_2O2$, $N_2O4$ and $N_2O6$.
Before induction, we preselected the target inspired $O_2$ % ($FIO_2$=35%), carrier gas and FAt des, the latter by increasing FAt until the age adjusted minimum alveolar concentration (MAC) read 1.3. AGC was activated after securing the airway. Besides patient demographics, the following data were collected every 5 sec up to 60 min: FGF, Vdes, FAdes, $FAN_2O$, $FIO_2$ and MAC. Groups were compared using ANOVA; data are presented as average and standard deviation.
**Results:** See Fig 1 and 2. For technical reasons, 4 pts were excluded ($N_2O2$ =1, $N_2O4$ =2, $N_2O6$ =1). Pt demographics did not differ. FGF followed the previously described pattern (1). After 10 min, Vdes in all $N_2O$ groups was identical and always lower than in any of the air groups; speed did not affect Vdes after 10 min (Fig 1). Differences between air groups disappeared after 60 min (Fig 1). MAC rose faster in the $N_2O$ groups (Fig 2).

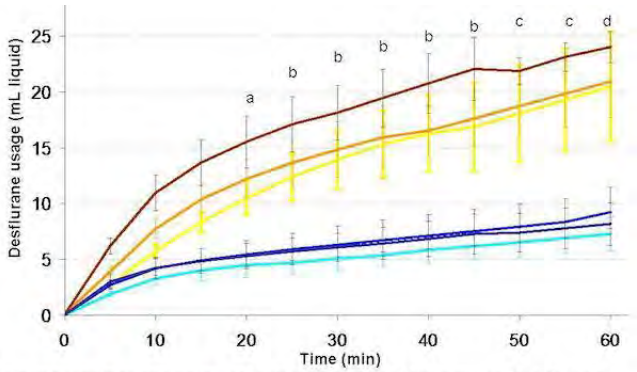


**Figure 1.** Vdes in different groups - see text for details and definition of abbreviations. Standard deviations only presented each 5 min for clarity. a=all air groups differ; b=AS6 differs from AS2 and AS4; c=AS6 differs from AS2; d=air groups no longer differ. $N_2O$ groups do not differ after 10 min.

*[Figure 1]*

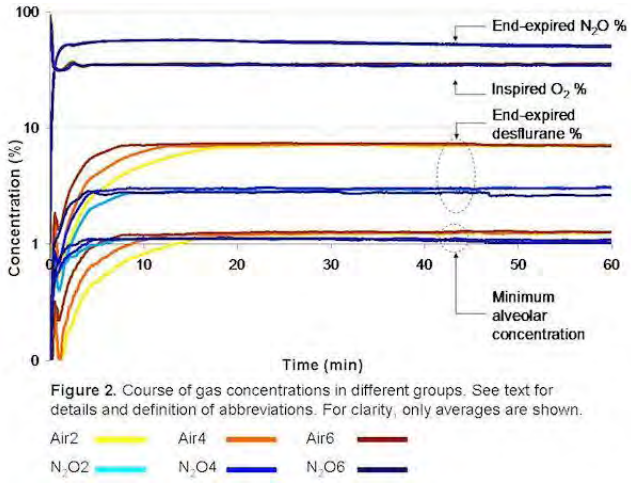


Figure 2. Course of gas concentrations in different groups. See text for details and definition of abbreviations. For clarity, only averages are shown.

*[Figure 2]*

**Conclusion:** Depending on speed, Vdes with AGC at 1.3 MAC after 1 h in $O_2$/air and $O_2$/$N_2O$ ranges between 20-24 and 7-9 mL, respectively ($p>0.05$) . Speed only affects Vdes with $O_2$/air, and is time dependent. $N_2O$ causes MAC to rise faster and decreases Vdes by 62% (all data combined).

**Reference:**

1. Carette R/ J Clin Monit Comput. 14/6/2015, pp 1-6. PMID: 26072157

## 01AP15-6

### The effects of low and minimal flow sevoflurane anesthesia on hepatic and renal functions

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**Background and Goal of Study:** The safety of low-flow and minimal flow sevoflurane anesthesia, during which compound A is formed by sevoflurane degradation, in humans has been questioned because compound A is nephrotoxic in rats. There are many controversial studies with data regarding nefrotoxicity and hepatotoxicity but is not registered even a single case in humans.

The purpose of this study is to compare the effect of moderate duration high flow versus low and minimal flow sevoflurane anesthesia on hepatic and renal functions.

**Materials and methods:** One hundred four patients, ASA physical status I-II, aged 18-65, weighing between 50-100kg, scheduled for elective maxillofacial surgery under general anesthesia that was expected to last from 1-4 hours, were enrolled in this prospective, randomized, double-blinded study. Patients were randomly allocated in three groups: group HF n=34 using High Flow (4.0L/min), group LF n=34 using Low Flow (1.0L/min) and group MF n=34 using Minimal Flow (0.5L/min) anesthesia with sevoflurane**.** Peripheral blood samples were taken for laboratory analysis before operation, 2 hours and 2 days after operation, for evaluation of renal and liver function through, blood urea (BUN), serum creatinine, aspartate aminotransferase (AST), alanine aminotransferase (ALT), lactate dehydrogenase (LDH), total bilirubin, and total protein, albumin, glycemia, K, Na and Ca.

**Results and discussion:** There were no significant differences between groups with respect to demographic data, ASA score and duration of anesthesia.

The difference between the mean value of glycemia, AST, ALT,LDH, total and direct bilirubine, total proteins and albumins in three groups 2 days after operation, was statistically insignificant ( p = 0.246, p=0.191 p=0.061, p=0.011, p=0.073, p=0.155, p=0.200, respectively, p=0,041476).

There was no significant difference between groups regarding to mean values of BUN and serum creatinine (p=0.096, p=0.717), and K (p>0.05), Na (p=0.594) and Ca (p>0.05).

**Conclusion(s):** These findings suggest that low and minimal flow sevoflurane anesthesia has no significant effects on hepatic and renal functions.

## 01AP15-7

### Even lower is possible: impact of flow rate on safety issues in low flow anaesthesia

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**Goal of Study:** We aimed to assess the effect of different flow rates of low flow fresh gas mixtures on hemodynamic state, gas exchange parameters and recovery time during general anaesthesia of urogenital system operations in a single tertiary centre.

**Materials and methods:** Sixty-two ASA Class I or II patients were enrolled for this study. The whole study population to whom low flow anaesthesia had been administered were subsequently gathered in three distinct -A, high flow, B, low flow, C, minimal flow- groups. Following induction, in Group A and B, 40% $O_2$, 60% $N_2O$ and 2% sevoflurane and in Group C, 60% $O_2$, 40% $N_2O$ and 2% sevoflurane mixtures were given in anaesthesia maintanence with a flow rate of 4 l/min for 10 minutes. Thereafter, flow rate was reduced to 2 l/min, 1 l/min and 0.5 l/min in Groups A, B and C, respectively. Hemodynamic data before and during anaesthesia, additionally, gas exchange and blood gas analysis parameters at 30th minute and before cessation of anesthesia were recorded. Recovery period was observed by a second physician and times of interest were noted.

**Results:** Demographic characteristics were similar among study groups. Data regarding vital signs, gas exchange and blood gas analysis at the 30th minute and prior to cessation of anesthesia were noted and most of the parameters were comparable. As expected, oxygenation parameters in blood gas analysis were significantly higher in group C during ($pO_2$, mmHg, 168.6±43.9 vs 165.4±39.9 vs 245.5±51.5, $p<0.001$; $SaO_2$, %, 98.6±1.1 vs 98.3±1.2 vs 99.2±0.9, p=0.019) and at the end of operation ($pO_2$, mmHg, 165.6±41.8 vs 152.7±64.3 vs 227.9±46.7, $p<0.001$; $SaO_2$, %, 98.1±1.4 vs 98.1±1.2 vs 98.8±1.1, p=0.028). Aside from this, during operation, inspiratory sevoflurane levels were significantly higher in Group A (1.7±0.6 vs 1.3±0.3 vs 1.3±0.3, p=0.043). There were no significant differences between the groups in terms of recovery data.

| | Group A (n=21) | Group B (n=20) | Group C (n=21) | p value |
|---|---|---|---|---|
| Time to spontaneous breathing (min) | 0.8±1.2 | 1.2±1.7 | 1.4±1.5 | 0.210 |
| Time to extubation (min) | 3±2.4 | 4.1±2.5 | 4.9±3.7 | 0.113 |
| Time to eye opening (min) | 6.8±4.5 | 7.3±3.6 | 8.2±3.5 | 0.500 |
| Time to verbal response (min) | 9±5.5 | 8.8±3.9 | 10±3.8 | 0.518 |
| Time to reach a Modified Aldrete Score of 9 or 10 (min) | 13.7±6.8 | 13.6±5.2 | 14.8±4 | 0.717 |

*[Table 1]*

**Conclusion:** Limiting the flow rate of gas mixture to 0.5 l/min in low flow anesthesia maintanence may facilitate reduced utilization of volatile anesthetics without a compromise in hemodynamic status and recovery process.

## 01AP15-8

### Nitrous oxide reduced a required dose of remifentanil during low flow sevoflurane anesthesia

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**Background:** Nitrous oxide ($N_2O$) offers sufficient analgesic effect during general anesthesia. One of disadvantages for using N2O is environmental pollution as a greenhouse gas. Previous studies demonstrated that N2O could reduce the dose of anesthetics and analgesics; however, large amount of N2O would devastate a sparing effect. The aim of current investigation was to evaluate the saving effect of N2O during low flow general anesthesia.
**Methods:** We retrospectively analyzed 20 cases of general anesthesia managed in the operation room of municipal hospital. The laparoscopic surgeries including appendectomy, cholecystectomy and colectomy were reviewed. All patients were induced using propofol, fentanyl and rocuronium, and the tracheas were intubated. The anesthesia was maintained with sevoflurane and remifentanil with or without N2O (Air or 70% N2O). Total fresh gas flow was set at under 1 l/min. During the preparation of laparoscopic procedures including the surgical port placement, the depth of anesthesia was appropriately modified and thereafter, the depth was maintained. The mean values of dose and concentration of drugs were compared using Wilcoxon Rank-sum test.

| | Control Group (Oxygen with air) | Nitrous oxide group (Oxygen with 70% nitrous oxide) |
|---|---|---|
| Age (yr) | 53.9 ± 28.7 | 64.8 ± 20.0 |
| Sex (m:f) | 8/2 | 8/2 |
| Height (cm) | 165 ± 9.4 | 164 ± 6.9 |
| Weight (kg) | 62.3 ± 11.6 | 61.7 ± 10.3 |
| Anesthesia time (min) | 140 ± 67.3 | 150 ± 54.0 |
| Operation time (min) | 104 ± 52.4 | 108 ± 53.5 |
| Average concentration of sevoflurane (%) | 0.80 ± 0.39 | 0.67 ± 0.14 |
| Average rate of remifentanil (μg/kg/min) | 0.33 ± 0.082 | 0.19 ± 0.054 * |

Data are expressed as mean ± SD. *: P<0.001 vs. control group

*[Table. The demographic data]*

**Results and discussion:** N2O slightly reduced the maintenance concentration of sevoflurane from 0.80% to 0.67% and significantly reduced the required dose of remifentanil from 0.33 to 0.19 μg/kg/min ($P$ <0.001). In Japan, the price of 1-ml sevoflurane is 0.36 Euro, 1 μg of remifentanil is 0.0098 Euro and 1 l of N2O is 0.065 Euro. Thus, when the body weight of patient is larger than 33 kg, the use of N2O can reduce the cost of general anesthesia.
**Conclusion:** There would be a plenty of social limitations, however, the anesthesia for overweighed patients would raise the cost of general anesthesia without N2O. The use of N2O might be useful in low flow anesthesia.
**References:**
1. Liu N, et al. Br J Anaesth 2014; 112: 842-51.
2. Sun R, et al. Cochrane Database Sys Rev 2015; 11: CD008984.
3. Nakada T, et al. J Anesth 2010; 24: 832-7.

## 01AP15-9

### Absorption and desorption characteristic of anesthetic xenon on silver exchanged zeolites

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**Background and Goal of Study:** Advances in xenon recovery will allow future improvement in the cost efficiency of xenon anesthesia. The developments of on-line adsorption systems which can reclaim xenon to purity and for the efficient future use on desorption to retain the full clinical benefit of xenon anesthesia.
**Methods and results:** Nano-sized zeolites as a novel absorbent were investigated targeting xenon separation from exhaled gas stream by adsorption. The silver exchanged zeolites synthesized as micro porous absorbents on which the gas response characteristics were examined to study the absorption capabilities of zeolites. The results obtained by simulation indicated that Silver exchanged zeolites (Ag-ETS-10) has stronger absorption capacity for xenon than for any other gases at low partial pressures due to high selectivity. This great affinity of this adsorbent for xenon is attributed to the presence of silver nano-particles, which grow on the surface of the molecular sieve after heat treatment of Ag exchanged material.
Xenon was recovered by thermal desorption at 300 C with helium purge. The xenon concentration in the extracted gas was extremely dependent on the high purge gas flow-rate and having consuming lot of energy. Thus, it was possible to obtain a gas mixture greatly enriched in xenon with a reasonably low content of oxygen for future use.
**Conclusion(s):** This recovered anesthetic xenon on desorption will be attractive for two broad applications: (1) Xenon know inert gas will be the anesthetic agent of choice for large fraction of millions of surgical procedures that are performed each year in the United States on patients with cardiovascular conditions (2) because of fewer complications with rapid induction and emergence, xenon anesthesia can reduce patient time in hospitals, with large benefits to healthcare costs.

## 01AP15-10

### Efficiency of consumption of anaesthetic agents within the department, while using low flow circle anaesthesia

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**Background:** It is important to use circle breathing systems for the delivery of volatile anaesthesia in a safe, efficient and cost effective manner. The implications are environmental pollution and the cost of anaesthetic agents.
**Methods of study:** A.To interrogate Drager anaesthetic machines in the main theatres, Aberdeen Royal Infirmary(ARI), over the period of 2 weeks in February 2015 and to get a snap-shot of information like: duration of the case, gases used, amount of carrier gases used, fresh gas flow rate (FGF, L/Min), volatile agent consumption(mls), volatile agent uptake(mls), per case.
B.To calculate the Volatile Ratio(VR) - agent consumption:agent uptake, i.e. what is evaporated:what is consumed by the patient and eventually absorbed by soda lime. The higher the Volatile Ratio is, the more inefficient usage of agents during the case.
C.To compare the collected data with the proposed standards[1]: 75% of anaesthetics with a duration less than 1 hour to have a VR
less than 3, 75% of anaesthetics with a duration more than 1 hour to have a VR less than 2.
D.To identify suggestions for improvement, with potential to carry Phase II Audit.
**Results:** In total, 230 anaesthetic cases were interrogated. Cases lasting less than 1 hour, or 1 hour sharp constituted 77 out of 230, and 153 cases lasted longer than 1 hour. Out of 77 short cases, VR was less or equal 3 only on 29 occasions, which is 37.66% in the group. Out of 153 longer lasting cases, VR was less or equal 2 on 41 occasions, which is 26.8% in this group. The correlation of VR with FGF was also identified. These data were re-audited in September 2015 - 80 cases considered, 28 short and 52 long cases. Out of 28 short cases VR was less or equal 3 on 17 occasions(60.7%), out of 52 long cases VR was less or equal 2 on 14 occasions(26.9%).
**Conclusion(s):** Overall, the efficiency of consumption of anaesthetic gases did not meet the proposed standards and suggestions for improvement were made: reminder to use low flow circle anaesthesia, with FGF of 1L/min or

less, also advise would be to set vapouriser to 2 times desired end-tidal agent concentration initially, so the desired concentration of the agent is reached very rapidly.
On re-auditing there was an improvement in the managing short cases.
We would encourage anaesthetists to review log-books on anaesthetic machines for self-learning.
**Reference:**
http://www.draeger.com/sites/assets/PublishingImages/Generic/sidebar-teaser/MEA/how-low-can-you-flow.pdf

## 01AP15-11

### Current practice of gas scavenging in pediatric anesthesia in Belgium: results of a nationwide questionnaire survey

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**Background and Goal of the Study:** Traditionally, an open breathing system without gas scavenging is used for induction with volatile agents in pediatric patients.
However, multiple adverse health outcomes are linked to occupational exposure to waste anesthetic gases (WAG). As a consequence, WAG scavenging has gained importance and it is advised to take measurements of WAG concentrations (WAGC) in the operating room (OR).
Hence, the aim of this survey was to investigate the application of gas scavenging during mask induction in pediatric anesthesia and the practice of WAGC measurement.
**Materials and methods:** In May 2015, the chairmen of all 94 Belgian departments of anesthesiology were invited by email to participate in a web-survey. After 4 reminders, the remaining non-responders received an identical written questionnaire by post. Descriptive statistics were used to summarize numeric responses.
A chi-square test for independence was performed to test for possible association between the use of gas scavenging (yes vs no) during induction of children aged 1 - 4 yr. and implementation of WAGC measurement (yes vs no) in the OR.
**Results and discussion:** From May 2015 to October 2015, 71 departments responded (76%).
Children aged <1 yr. were operated in 68 of 71 responding hospitals and above 1 year old in all responding hospitals.
Gas scavenging during mask induction in children aged <1 yr. was applied in only 34 of 68 departments (50%). During induction in children aged 1 - 4 yr. and >4 yr., respectively 41 (57,7%) and 49 (69%) of 71 responding departments applied gas scavenging.
The past 5 years, WAGC measurements were taken in 18 departments, in 46 none were taken and in 7 data were missing.
After exclusion of departments with missing data, an association could be shown between the use of gas scavenging during mask induction and implementation of WAGC measurement at a significance level of $\alpha = .05$ (for children aged 1 - 4 yr: $X^2 = 4.716$ ; $p = 0.0298$).
**Conclusion(s):** The application of gas scavenging during mask induction in pediatric anesthesia is rather infrequent in Belgian hospitals and is proportional to age of the patient (lowest in children aged <1yr). Furthermore, we found a strong association between the use of gas scavenging during mask induction and implementation of WAGC measurement in the OR. This implies that implementation of WAGC measurement in the OR should be obligatory in all hospitals in an attempt to reduce occupational exposure to WAG.

## 01AP15-12

### Lung ultrasound, atelectasis and PEEP determination

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**Introduction:** Patients undergoing general anesthesia and mechanical ventilation often develop pulmonary atelectasis. Adequate PEEP levels can improve oxygenation, reducing ventilator induced injuries. Electrical impedance tomography (EIT) is particularly useful for monitoring lung function. EIT can be helpful in measuring distribution of ventilation and lung volume changes. The aim of this study is to determine whether lung ultrasound (US) is a good tool to set PEEP levels compared to impedance tomography.
**Methodology:** After IRB approval, patients that were going to have lower abdominal surgery were invited to join the study. The disposable range of EIT electrodes (Timpel®, DX-1800, Dixtal, Brasil) were positioned in the thoracic area between the 4th and 5th intercostal space. US evaluation was made one intercostal space above diaphragm in the medial axillary line. After anesthesia induction, a recruitment maneuver lasting 2 minutes was performed with pressure controlled ventilation, 15 bpm, inspiration:expiration ratio of 1:1, PEEP of 20 cm $H_2O$ and an inspiratory pressure of 40 cm $H_2O$. After the recruitment maneuver, PEEP titration was initiated decreasing 2 cm$H_2O$ between each evaluation. Evaluation with EIT and US were made at each titration level and in the end of surgery. PEEP was determined considering lung collapse formation with the lowest levels of hyperdistension. Lung collapse was evaluated by B2 lines: a comet-tail artifact, arising from the pleural line, moving in concert with lung-sliding. Spearman's correlation between both techniques for determined PEEP values was evaluated.
**Results:** Eight patients were enrolled: 7 males and 1 female, physical status ASA II. Mean age of 49,39 ±10,52 (standard deviation) years, BMI 27,14±3,63 kg/m². All patients developed atelectasis at the end of the surgical procedure. There was a strong correlation (r=0,9) between both techniques.
**Conclusion:** Considering that all acute changes induced by anesthesia may lead to pulmonary atelectasia, US can provide additional information with the main advantage of being performed dinamically. These partial data indicates that US is a promising method to help determine PEEP levels and evaluate the presence of pulmonary atelectasis.
**Reference:**
Lichtenstein D, Mezière G, Seitz J. The dynamic air bronchogram. A lung ultrasound sign of alveolar consolidation ruling out atelectasis. Chest 2009; 135: 1421-1425.

## 01AP16-1

### Comparison between refraining from using neuromuscular blockade and using neuromuscular blockade with sugammadex in perioperative management of the patients with myasthenia gravis

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**Background and Objective:** Prior to sugammadex use, maintaining anaesthesia for myasthenia gravis (MG) using minimal muscle relaxants (MR) was common. Recently, a case series of successful management using MR and sugammadex in MG patients was reported. However, the comparison of the safety for perioperative management between not using MR (N group) and using MR with sugammadex (S group) is unclear. We demonstrated the success rate of extubation in the operating room for thymectomy in MG patients and the rate of impossible extubation requiring ventilation in the N group (2015, J Anesth.). We retrospectively compared the success rate of extubation in the operating room and the postoperative respiratory condition between the N and S groups.
**Materials and methods:** All 60 patients diagnosed with MG who underwent surgery under general anaesthesia before the use of sugammadex in Japan (between January 2004 and March 2010) were eligible for the N group. Similarly, all 41 MG patients between April 2010 and November 2015 in whom sugammadex and MR were applied were included in the S group. We investigated the success rate of extubation in the operating room and perioperative complications, comparing groups N and S.
**Results and discussion:** The success rate of extubation in the operating room in group S of median100 % (95 % Confidence Interval (CI): 94-100 %) was significantly higher than in group N of 71.7 % (43/60) (95 % CI: 65.9-77.5

%) (P<0.001). However, there were 3/41 (7.3 %) patients in group S who were re-intubated and required artificial respiratory management. This rate was not significant compared with the rate of impossible extubation requiring ventilation (3/60) in group N (P=0.684).
**Conclusions:** A significantly higher success rate in the extubation of MG patients in the operating room in perioperative management was achieved using MR and sugammadex than when not using MR. Therefore, we hypothesised that when using sugammmadex we could obtain sufficient recovery from muscle relaxation in MG patients because of the 100 % success rate of extubation in the operating room. However, there were 3/41 (7.3 %) patients in group S who were re-intubated and required artificial respiratory management.

## 01AP16-2

### Is sugammadex safe in neuromuscular disease? The sucessful use of sugammadex in a patient with Guillain Barre Syndrome

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**Background:** Sugammadex is a new neuromuscular reversal agent that is frequently used in difficult entubations and some other states like protecting the patient from side effects of anticholinesterases or for the sake of intermittant reverse of muscle relaxant agents. Life threatening emergency cases and neuromuscular diseases are both the states that security of sugammadex is unknown.In this case we reported the succesfull use of sugammadex in a patient with Guillain Barre Syndrome (GBS).
**Case report:** 48 years old male patient was scheduled for hemicolectomy operation with a diagnosis of colon cancer. He had lower extremity disability due to GBS for 34 years and had no any other medical problem. On the operation day; after routine premedication and monitorization in operation room; he received fentanyl, propofol and rocuronim for anesthesia induction in appropriate doses. Operation continued for 3 hours, remifentanil,sevoflurane and rocuronium were used in maintenance. At the end of the surgery sugammadex(SGX) 4 mg/kg was administered and patient was ready for extubation in four minutes and he was transferred to intensive care unit(ICU) after a successful extubation.There was no complication in the postoperative period and he was discharged after 10 days.
**Discussion:** GBS is an acute inflamatory polyneuropathy characterized by symetrical disability and areflexia. Patients can exhibit otonomic disfunction, malign hyprthermia, rhabdomyolisis and idiopathic reactions against to neuromuscular blocking agents and also mechanical ventilation support can be needed in postoperative period due to muscle weakness. SGX is a modified cyclodextrin and makes an inert complex with rocuronium.It is widely admitted as a safe agent in many special patient groups. Neverthless literature is not enough about the use of SGX in neuromuscular diseases. Since it reverses the neuromuscular block more rapid and effective way when compared to anticholinesterases, SGX may be advantageous for the reversal of neuromuscular blockage especially in patients with neuromuscular disorders since they may cause elongated neuromuscular block. In our case SGX cause no complication in the perioperative period and progressed a succesfull anaesthetic management.
**Learning points:** The efficacy and safety of SGX in patients with neuromuscular disorders have not been determined in the literature. In our case SGX is successfully used for reversing neuromuscular blockage in a patient with GBS.

## 01AP16-3

### Safety of sugammadex in patients with preoperative normal or high urine specific gravity

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**Background and Goal of Study:** Sugammadex encapsulates the steroidal neuromuscular blocking agent, rocuronium. It is the first selective relaxant binding agent and a modified gamma-cyclodextrin. As sugammadex is primarily cleared renally, the renal efficacy and safety of sugammadex for reversal of rocuronium-induced neuromuscular block (NMB) in patients with preoperative normal or high urine spesific gravity is the objective of this study.
**Materials and methods:** Forty-six ASA I-II patients (age of 18-65 years) undergoing otorhinolaryngologic surgery procedures with general anesthesia were included in the study. Patients with impaired renal function tests were excluded. Anesthesia was induced using i.v. propofol and remifentanil, was maintained by sevoflurane. Neuromusculer monitoring was recorded with train of four (TOF). Rocuronium (1mg/kg) was given, followed by a single i.v. dose of sugammadex (4mg/kg) for reversal of deep NMB (TOF=0, PTC=2). A urine sample was taken on admission to the operating room. The primary end point was differences in renal functional tests (GFR and serum BUN, creatinine, electrolytes) on preoperatively and 24 hours postoperatively. The secondary end point was to detect the time to stabilization of the TOF ratio to 0.9. The urine-spesific gravity 1020 or higher was considered to be hypohydration. If the urine-spesific gravity was between 1003-1019, it was considered to be euhydrated.
**Results and discussion:** Twenty-three patients had high urine-spesific gravity and 23 patients had normal urine-spesific gravity. After sugammadex administration, euhydrated patients had a mean GFR of 117.43 in 24 hours postoperatively and hypohydrated patients had mean GFR of 129.65 in 24 hours postoperatively (p>0.05). The mean time to recovery of the TOF ratio to 0.9 was 2.8 min in euhydrated patients and 3.2 min in hypohydrated patients. The TOF difference was not statistically significantly among the groups (p>0.05).
**Conclusion(s):** Regarding the effects on renal function and safety of sugammadex in patients with preoperative normal or high urine-spesific gravity, sugammadex rapidly and effectively reverses deep rocuronium-induced NMB both in euhydrated and dehydrated patients. Our results reached the conclusion that sugammadex can be administered safely even in insufficiently hydrated patients.

## 01AP16-4

### Role of sugammadex in intraoperative phrenic nerve monitoring during cryoablation procedure

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**Background:** The role of sugammadex for monitoring phrenic nerve during cryoablation procedure, minimizing phrenic nerve paralysis.
**Case report:** A 35-year-old, 75kg man with paroxysmal atrial fibrillation and otherwise healthy, was transferred to our hospital for cryoablation procedure. The surgery was performed under general anesthesia, TIVA modality with propofol and remifentanil, we proceed to induction with these drugs followed by 45 mg EV of rocuronium. 30 minutes later, when a proper phrenic nerve stimulation was required and with the assessement of train-of-four monitoring, we administered 70 mg EV of sugammadex, reversing neuromuscular blockage.
The surgery was uneventul finishing 90 minutes later. We provided analgesia with paracetamol and metamizol regarding that cryoablation is less painful than radiofrequency ablation.
**Discussion:** Cryoablation is an energy alternative to radiofrequency for ablation of various arrhythmias, where its unique biophysical properties offer a greater safety profile and an effective source in the long-term. Phrenic nerve paralysis is the most frequent complication during cryoballoon ablation, occurring in 7%-9% of the cases, however, this is reversible in nearly all cases(1). Better phrenic nerve monitoring during right-sided pulmonary vein ablation and less vigorous wedging maneuvers in the pulmonary vein ostia might reduce this complication(2).

We have not found any recent literature regarding the use of sugammadex in this context. In our case sugammadex provided excellent conditions for an adequate stimulation of the phrenic nerve and it could decrease the risk of phrenic nerve paralysis without any adverse effect.

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**Learning points:** Cryoablation, with its unique biophysical properties is a valuable alternative to radiofrequency for ablation of various arrhythmias.
Phrenic nerve paralysis is the most frequently observed complication during cryoballoon ablation.
Sugammadex provides excellent conditions for an adequate stimulation of the phrenic nerve, minimizing the risk of paralysis and without any adverse effect.

## 01AP16-5

### The effectiveness of muscle relaxation: consideration of the operating surgeon during laparoscopic procedures

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**Background and Goal of Study:** The issue of the optimum level of NMB in relation to different types of surgery is debatable. Some studies show the benefits of deep NMB, but this approach is not widely used because of high risk of residual relaxation. The aim of this study was to evaluate the efficacy of maintaining a deep NMB during laparoscopic procedures from the perspective of convenience of surgical procedures, and evaluate the safety of this method.
**Materials and methods:** We examined 38 patients undergoing laparoscopic procedures under general anesthesia with NMB: ASA I-II, mean age 52.3 (26-69 years), male - 14(37%). Patients were randomized to two groups: in group I (n=18) we maintained a deep NMB at PTC 2 until the end of the operation; in group II (n=20) we maintained an average depth NMB at T2 level. NMB reversion has been performed after surgery with sugammadex: 4 mg/kg in group I; 2 mg/kg in group II. Tracheal extubation has been implemented only after the recovery NMT to the TOF level ≥0,9. After the end of intervention the operating surgeon was invited to give a personal assessment of the adequacy of NMB (unsatisfactory, satisfactory or optimal) on a scale at the start, at the main stage and at the final part of surgery. To analyze the results we used nonparametric two-sample Kolmogorov-Smirnov test. Stat. significance was assumed at $p<0.005$.
**Results and discussion:** Recovery of NMT to TOF 0,9 level occurred within 4 min after the administration of sugammadex and tracheal extubation within 11 min after the end of surgery. There were no incidences of residual relaxation. Comparison of the results of surgeon's survey shows that the percentage of positive rating of NMB (satisfactory and optimal) in the group I was higher than in the group II of an average of 11%. When we compared only the optimal ratings of the NMB - percentage in the group I was higher than in the group II of an average of 44%. Decrease in surgeon's satisfaction by quality of a relaxation to the end of operation has been revealed.
**Conclusion:** Maintaining a deep NMB during laparoscopic surgery provides better conditions for surgical procedures from the perspective of the operating surgeon. The ending of surgery is the most "problem" period from the point of view of the inadequacy of NMB. Maintain a deep NMB to the "last stitch", followed by a complete recovery suggests an objective NMT monitoring and reversion.

## 01AP16-6

### Anaphylactic reaction to rocuronium with sugammadex reversion

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**Background:** Allergic reactions in anaesthesia are rare but potentially fatal. Among all anaesthetic drugs, neuromuscular relaxants are the most frequently involved in allergic reactions (55-69%) and rocuronium is one of the most frequent agents.[1,2]
**Case report:** We describe the case of a 12 year-old male patient, submitted to appendectomy, showing anaphylactic life-threatening reaction at anaesthetic induction, after injection of rocuronium, with severe bronchospasm, bradicardia and systemic cutaneous-mucous rash. Despite performing the recommended pharmacological and hemodynamic support measures, systemic repercussions and clinical instability only reversed after sugammadex administration. The patient was referred to immunoallergology consultation. A skin prick test was performed, confirming rocuronium allergy.
**Discussion:** Allergic reaction treatment involves the elimination of the causing agent and hemodynamic support measures.[1] Sugammadex is a new drug, approved as a specific rocuronium antagonist, encapsulating its molecules and eliminating them from circulation, therefore reversing the rocuronium effect.[2] Currently, after some well-succeeded cases described, sugammadex is thought to have an effect against anaphylactic reactions to rocuronium. Nevertheless, it is not yet approved for this use, and it should only be administrated as an adjuvant to conventional measures. Further studies are needed to confirm its possible effect as a therapeutic measure against rocuronium's anaphylaxis.[2,3]

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3. Funnell A.E., Griffiths J., Hodzovic I. (2011) A further case of rocuronium-induced anaphylaxis treated with sugammadex. British Journal of Anaesthesia 107 (2), 275-276.

**Learning points:** In Anaesthesia, the safety of the patient is the priority and allergic reaction is one of the most serious risks. Due to its mechanism of action, sugammadex may represent a solution to life-threatening allergic reactions by rocuronium, one of the most common neuromuscular blocking agents and so, one of the most frequent anaesthetic agents involved in anaphylactic reactions.

## 01AP16-7

### Type II diabetes mellitus prolongs rocuronium induced neuromuscular blockade irrespective of glycaemic control

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**Background:** Type II diabetes mellitus (DM) can lead to decreased nerve conduction velocity as a result of segmental demyelination and partial degeneration of nerve fibers and loss of motor units (1,2). Thus, recovery from neuromuscular blockade can be delayed and the risk of postoperative residual neuromuscular blockade (RNMB) can be an important anesthetic consideration in diabetic patients undergoing general anesthesia.
The aim of this study was to analyse the recovery from rocuronium and the risk of postoperative RNMB in type II diabetic patients undergoing general anesthesia with sevoflurane.
**Methods:** The patients undergoing general anesthesia with sevoflurane and rocuronium for abdominal surgery were included in this prospective observational study design between December 2014 - May 2015. After rocuronium injection; time to reappearance of T1, T2, T3 and T4 and time to reaching TOF ratio 0.7 and 0.9 were recorded. For detecting RNMB, TOF ratios were recorded in the postoperative care unit at $5^{th}$ and $10^{th}$ minutes of arrival. The correlation between glycemic control and the risk of RNMB was also evaluated via glycosylated haemoglobin ($HbA1_c$) levels.
**Results:** A total of 82 patients (Group DM: 48 patients, Group non-DM: 34 patients) were included. The groups were comparable according to demographic data and other characteristics that can effect neuromuscular blockade. Times to reappearance of T1, T2, T3, T4 and to reaching a TOF ratio of

0.9 were significantly longer in Group DM. Although there was no difference between the TOF ratios at the arrival to the postoperative care unit, TOF ratios of Group DM were significantly lower at 5th and 10th minutes at postoperative care unit. Poor glycaemic control was found not to affect the risk of RNMB.
**Conclusion:** Even in the absence of known neurologic complications; the neuromuscular blockade effect of rocuronium is longer and the risk of RNMB is higher in type II diabetic patients irrespective of the degree of glycaemic control.
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## 01AP16-8

### Anesthesia for Guillain-Barré Syndrome - do we need neuromuscular blocking agents? A case report

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**Background:** Guillain-Barré (GB) syndrome is a challenge for the anesthesiologist. Our purpose is to report and discuss the anesthesia of a GB patient for major orthopedic surgery, managed without neuromuscular blocking agents.
**Case report:** Male, 43 years old, ASA II, proposed for a total hip replacement. History of complete paralysis caused by GB 4 years ago with partial recovery after therapy. On admission, moderate muscular weakness without apparent respiratory compromise. We induced anesthesia with fentanyl 100μg and propofol 200mg and we inserted an orotracheal tube without difficulties. During surgery we administered desflurane 4.1 to 6.0% endtidal, fentanyl 200μg, paracetamol 1g and parecoxib 40mg. Surgery lasted for 2 hours and was accomplished uneventfully. Patient was hemodynamically stable and the tracheal tube was removed at the end of the surgery without complications.
**Discussion:** Our case shows that GB patients can be successfully submitted to major orthopedic surgery under general anesthesia without any neuromuscular blockers. Previous reports of anesthesia in GB stated three points: first, the potential of neuroaxial anesthesia to worsen the disease, second, the risks of hyperkalemia and cardiac arrest with succinylcholine, third, the increased sensivity of these patients to non-depolarizing drugs [1-2]. As neuromuscular blockers are not absolutely precluded, a point that is usually missed is why patients with muscular weakness need relaxants. As far as we know, in evidence-based anesthesia, we do not find any support to use relaxants in GB and our case also suggested its futility in patients with muscular weakness. In consequence we recommend its use only as rescue in cases where muscular function is enough to produce difficult surgical conditions.
**References:**
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2. Succinylcholine-induced Hyperkalemia in Acquired Pathologic states: Etiologic Factors and Molecular Mechanisms. The Journal of the American Society of Anesthesiologists.
**Learning points:** In GB patients, depolarizing drugs have the risk of hyperkalemia, and non-depolarizing drugs are associated with prolonged blockage and post-operative ventilatory support. What evidence supports the need of neuromuscular blockers during general anesthesia for GB? Our case suggests that we do not need neuromuscular blockers to anaesthetize GB patients with muscular weakness.

## 01AP16-9

### Safety of rocuronium and sevoflurane in acute intermittent porphyria - a case report

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**Background:** Anaesthetic management of a porphyric patient is challenging, since various peripoperative conditions and some anaesthetic drugs may trigger a crisis. Porphyrias are a group of hereditary enzymatic defects in the biosynthetic pathway of heme, classified as hepatic or erythropoietic, acute or cutaneous, based on symptoms. Acute intermittent porphyria (AIP) is a rare metabolic disorder, due to partial deficiency of porphobilinogen deaminase inherited by the autosomal dominant route. An acute attack may be triggered by factors such as sex- hormone fluctuations, fasting, dehydration, stress, infection, injury and drugs. A porphyric crisis may present as severe and poorly localized abdominal pain, cardiovascular disorders, peripheral neuropathy, motor weakness, psychiatric manifestations. Electrolyte disturbances and urine hyperpigmentation may occur.
**Case report:** A 45-year old female patient with a known history of AIP scheduled for total thyroidectomy. She was diagnosed at the age of 22, after appendectomy. Since then she reports milder symptoms usually before menstruation. Her medical history includes anaemia, hypothyroidism and hypertension. Anaesthesia was induced with fentanyl , propofol and rocuronium 0.1mg/kg and was maintained with fentanyl and sevoflurane 1.5-2% in a mixture of o2/n2o. Atropine/neostigmine was used for reversal. Other drugs administered were paracetamol and ondasetron. Intraoperative monitoring included: ECG, etCO2, SpO2, NIBP, TOF. The operation lasted for 2 hours and the patient emerged from anaesthesia uneventfully.
**Discussion:** Drugs recommended to be safely used in anesthesia for AIP patients are renovated up-to-dately. Midazolam, opiates, propofol, succinylcholine, halothane, vecuronium , lidocaine and nitrous oxide are considered to be "safe" whereas etomidate and barbiturates are contraindicated in AIP. Most modern anaesthetic drugs, such as rocuronium and sevoflurane, are considered to be well-tolerated
**References:**
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**Learning points:** Since porphyrogenicity of drugs can't be predicted and our databases are based mostly on anecdotal clinical reports, large clinical studies on the use of anaesthetic drugs are needed.

## 01AP16-10

### Paradoxal effect of atropine: are we doing our best to prevent it?

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**Background and Goal of Study:** Atropine was isolated over 180 years ago, but some peculiarities of its action are still surrounded in doubt. Small doses of the drug have been found to cause a paradoxal effect, and in adults international resuscitation guidelines uphold the use of 0,5mg as an initial dose, independent of body weight. However, different clinicians prefer to use 10 mcg/Kg. We decided to see if there was any difference in the incidence of paradoxal effects of atropine with either option, auditing local practice in the last year.
**Materials and methods:** Retrospective study (audit) comparing data from patients treated with 0,5mg or 10mcg/Kg after developing severe intraoperative bradicardia (<40 bpm) accompanied by a drop in blood pressure.
**Results and discussion:** In 12 months we identified 12 patients treated with 0,5mg atropine, 5 of which (41,7%) developed paradoxal effect of atropine, with development of a junctional rhythm that promptly reverted after administration of a further dose of 0,5mg atropine. Most of those who did develop paradoxal effect were receiving remifentanyl (5 out of 7), whereas this opioid was only used in 1 of the 5 patients treated with 0,5mg atropine that did not develop paradoxal effect.
On the other hand, during the same time period 4 patients were treated with 10 mcg/Kg of atropine, none of which developed paradoxal effect, even

though 3 of them were receiving remifentanyl.
The number of patients involved does not allow for statistically significant changes between groups to be identified either through Fisher's exact test or Mann-Whitney test. However, logistic regression with the outcome variable defined as paradoxal effect development and independent variables being atropine dose and remifentanyl use leads to a statistically significant model (Omnibus test p-value=0,012), statistically adjusted to the data (Hosmer-Lemeshow test p-value=1,0), with a Nagelkerke pseudo-R2 of 0,571, even though individual Wald statistics show a p-value>0,05. Still, the small *n* advises caution in this analysis.
**Conclusions:** The present study shows that paradoxal effect of atropine is clinically more common than usually considered, occurring in day-to-day practice. However, the number of patients studied was too small to draw any firm conclusions. While a small dose of atropine (0,5mg independently of body weight) and possibly remifentanyl use appear to constitute risk factors, further, larger studies are needed to clarify the matter.

## 01AP16-11

### Safety, pharmacokinetics, and pharmacodynamics of infusion and bolus plus infusion doses of ABP-700

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**Background and Goal of Study:** ABP-700 is a positive allosteric modulator of the $GABA_A$ receptor being developed for procedural sedation and general anesthesia. The goal of this phase 1 study was to determine the safety, pharmacokinetics (PK), and pharmacodynamics (PD) of ABP-700 using various infusion dosing regimens.
**Material and methods:** This study was performed following ethics committee approval in accordance with the Declaration of Helsinki and in compliance with GCP. This single-blind, randomized, placebo and propofol controlled ascending infusion dose study was performed in 64 healthy volunteers in 8 cohorts. Safety assessments included clinical labs, hemodynamic, respiratory and adverse event (AE) monitoring. Adrenocortical function was assessed using the ACTH stimulation test. PD effect was measured using MOAA/S and BIS. The first 56 subjects (7 cohorts) were randomized (5:2:1) to ABP-700, propofol or placebo:

- Four ABP-700 constant rate cohorts each of 8 subjects received 30 min infusions of 30, 40, 50 or 60 μg/kg/min.
- One ABP-700 cohort of 8 subjects received 30 min infusions of 50 μg/kg/min preceded by 1 μg/kg of fentanyl.
- Two ABP-700 bolus plus infusion cohorts each of 8 subjects received either a 0.35 mg/kg bolus or two 0.25 mg/kg bolus injections given 2 min apart, both followed by 50 μg/kg/min for 30 min. Both cohorts received1 μg/kg of fentanyl as a pre-medication.

One additional cohort of 8 subjects received a 3-stage infusion of 100/70/58 μg/kg/min for 3/6/21 mins with ABP-700 alone (n=4) or with 1 μg/kg of fentanyl as pre-treatment (n=4).
**Results and discussion:** Subjects ranging from 18-45 years old were predominantly white (95%) and male (98%). ABP-700 was safe and well tolerated with the majority of AE's reported as mild. Adrenal suppresion was not observed at any dose. For constant rate infusions, arterial PK was linear with peak concentrations ($C_{max}$) of 1090-1970 ng/mL and a terminal half-life ($T_{1/2}$) of 10.3-16.9 mins. PD effects were generally dose dependent. Bolus followed by infusion and 3-stage infusions produced more uniform and deeper clinical sedation when compared to infusion alone.
**Conclusions:** PK was linear and dose-proportional. The PD effects were dose dependent and rapidly reversing at all doses. The differences in both type and frequency of AEs were consistent with the mechanism of action of ABP-700. The overall profile of ABP-700 supports further infusion dose characterization.

## 01AP16-12

### Prolonged neuromuscular blockade following a bolus of succinylcholine and Rett syndrome- a case report

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**Background:** Rett syndrome is a neurodevelopment syndrome that affects mostly women, caused by mutations in the gene encoding the transcriptional repressor methyl-CpG binding protein 2 (MeCP2) that regulates the expression of a wide range of genes in the hypothalamus, involved in multiple neuropsychiatric disorders. It is characterized by progressive loss of intellectual, motor and communication abilities, seizures and electroencephalographic abnormalities.
Associated target-organ damage (cardiac and pulmonary) and skeletal deformations may be present as well as a difficult airway, leading to a challenging anesthetic management.
**Case report:** We report a case of a 38 years old woman, with Rett syndrome, proposed for a dental extraction under balanced general anesthesia. She had no past surgeries. The preoperative laboratory values were normal.
She was premedicated with 7,5mg of oral Midazolam. A successful rapid sequence induction was done with Fentanyl (0.1 mg), Propofol (170 mg) and Succinylcholine (50 mg, 1mg/kg).
During the surgery, she presented a prolonged neuromuscular blockade. In the first 60 minutes there were no responses on the Train Of Four (TOF) ratio. The complete reversion of the blockade was only achieved 90 minutes after the Succinylcholine bolus.
**Discussion:** Despite not being contraindicated, succinylcholine should be carefully used in patients diagnosed with Rett syndrome, due to its reported association with hyperkalemia and resulting arrhythmias.
In a patient with a prolonged neuromuscular blockade without any other apparent cause, we question the existence of a possible association between the blockade and the fact that Mecp2 also regulates the expression of the succinylcholine receptor gene.
No other case of prolonged neuromuscular blockade using succinylcholine in a patient with Rett Syndrome was found in the literature.
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**Learning points:** Succinylcholine used on Rett syndrome patients should be done carefully, not only due to the already described risk of arrhythmias, but also for an apparent risk of prolonged neuromuscular blockade.

## 01AP17-1

### Evaluating variables contributing to low intraoperative bispectral index values

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Adequacy of depth of anaesthesia (DOA) has deserved wide attention: too light anaesthesia may result in awareness and too deep anaesthesia may be harmful. Bispectral Index (BIS), an EEG derived parameter, allows the assessment of the DOA. Recently, cumulative time of excessive anaesthesia, defined as BIS below 45, has been associated with increased post-operative mortality (1). However, few studies have assessed the incidence of low BIS in anaesthesia practice.
This study was performed with the goal of assessing the incidence of low BIS in our clinical practice as well as variables influencing it.
**Methods:** This was a prospective observational study with IRB approval. During 6 weeks on weekdays the neurosurgery, orthopedics and general surgical unit was visited twice daily for data gathering. A 11 question form was filled by the anaesthetist and the anaesthesia record was later examined regarding percentage of time with BIS values below 45. Demographic, anaesthetic, surgical and other variables were also included for analysis.
**Results and discussion:** A total of 304 cases were assessed and 218 cases fulfilled all criteria to be analysed. BIS was below 45 during 68% of the time.

Low BIS was influenced by ASA classification, with a higher incidence of low BIS for class IV ($p<0,01$) - BIS below 45 for 91,8% of the time. The type of anaesthesia also influenced BIS values, with balanced anaesthesia having a greater percentage of time of low BIS in comparison to a total inhalatory anaesthesia ($p<0,01$). Variables such as patient age, sex, BMI, day of the week, emergency, OR location, the experience of the anaesthesiologist , the type of surgery and the difficulty controlling the depth of anaesthesia did not show statistical significance predicting a high or low incidence of BIS below 45. Anaesthesiologists were aware that a study aimed at evaluating the incidence of BIS below 45 was being conducted.
**Conclusions:** Our results show an incidence of BIS below 45 as percentage of anaesthesia time of 68%. Despite of the current awareness about the need to adequately control depth of anaesthesia there was a high incidence of low BIS. We also found that ASA classification and type of anaesthesia can influence that total time of low BIS. The fact that many variables initially supposed influential weren't related to the incidence of low BIS suggests that maybe the individual anaesthesiologists' attitude can have a decisive role in these values.
1) Anesth Analg 100(1): 4-10.

## 01AP17-2

### Comparision of intraoperative hemodynamic responses in "dipper" and "non-dipper" patients; with BIS monitoring

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**Background and Goal of Study:** Through the 24 hour observation of Holter blood pressure when there is less than10% drop during the night, it is defined as "non-dipper" blood pressure patern. It has been found that; "non-dipper" patients have a higher cardiovascular risk and target organ damage (1-3). In preoperative evaluation, even people with no blood pressure problems, intraoperative hypertensive response and attacks pose a risk in terms of mortality and morbidity. Therefore; in our study, we aim to comfirm if "non-dipper" patients while under anesthesia are whether under the risk of hemodynamic instability or not.
**Materials and methods:** In the study; ASA I-II, elective surgery, normotansive, between 18-64 years, no preoperative medicine usage, total of 60 patients were included. One day before the operation, patients were evaluated and diagnosed with ECHO (echocardiography) and HOLTER monitoring for "dipper" (n:30, Group I) and "non-dipper" (n:30, Group II) groups. With the usage of same anesthetic agents BIS was kept constant between 40-50. Preoperative, intraoperative and postoperative hemodynamic parameters (systolic, diastolic, mean blood pressures, heart rate, peripheral oxygen saturation, end-tidal CO2) were recorded.
**Results and discussion:** In terms of demographic characteristics the groups were found similar ($p>0.05$). In terms of hemodynamic parameters measurements, at all time, were not significantly different between the groups ($p>0.05$).
**Conclusion(s):** In ASA group I-II patients, exposed with the anesthetic agents used in our study and "non-dipper" blood pressure pattern do not pose a risk for perioperative hemodynamic instability. We concluded that there is no practical value of making diagnosis when there isn't any clinical finding, except informing the patients about the cardiovascular risks for later ages.
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## 01AP17-3

### Entropy monitoring in hepatic patients undergoing major liver resection. A randomised controlled study

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**Background and Goal of Study:** Inappropriate titration of the anaesthetic agents can lead to an under or excessive depth of anaesthesia. Aim is to study effect of introducing Entropy monitoring during major liver resection among cirrhotic patients with chronic hepatitis C (Child A) undergoing major liver resection.
**Methods:** 60 consecutive patients were randomly divided into two groups in a hospital based comparative study registered in Menoufiya University, Egypt. Group I guided with Entropy, Group II guided with standard practice (Entropy obscured from Anaethesist). Sevoflurane with $O_2$/Air 50% at 2 l/min adjusted to achieve a State (SE) and Response (RE) Entropy (40-60 with a gradient of 5-10. Boluses of Fentanyl (1 - 2 $\mu$g/kg) were given if the difference between SE and RE was more than 10 for more than two minutes. Sevoflurane (ml) consumed were monitored by GE Datex-Ohemda S/5 Anesthetic Delivery Unit System.
**Results:** Age, weight and fentanyl consumption were comparable between both groups ($P>0.05$). Mean (SD) Sevoflourane consumption (ml) after 2hr, 4hr, and 6hr in GI (Entropy) versus II (Standard) were 16(2.19) vs 20.8(1.88), 10.7(1.94) vs 17.4(1.92), and 9(1.22) vs 14.1(2.19), $P<0.01$. Reduced end tidal sevoflourane (%) in G I (Entropy) vs GII after 2hr and 4hr (1.4 (0.12) vs1.6 (0.07) and 1.4 (0.11) vs 1.6 (0.07) Total sevoflurane consumped was reduced by 31% in G I (Entropy) when compared with GII (Standard Practice). The Propofol induction dose with entropy was also lower (GI, 156.6$\pm$22.2 mg vs G II, 184.6$\pm$15 mg, $P<0.05$). An increase in anaesthesia depth was observed in patients not monitored by Entropy in G II vs GI, repectively. SE after 2hr of anaesthesia was 47 (4.44) vs 54 (6.58). RE after 2hr was 48(4.38) vs 53(6.96). Mean arterial pressure was reported to be higher in GI (Entropy) compared to GII through out surgery
Extubation time and intensive care stay was shorter with Entropy (GI, 4.52$\pm$2 vs GII, 7.72$\pm$2 min, $P<0.01$) and (1.40 $\pm$ 0.50 vs 1.64 $\pm$ 0.48, days $P=0.09$) respectively. Blood loss (ml) in GI 567.22$\pm$70.72 vs GII 571.2$\pm$72.28, $P>0.05$. Anaesthesia time was comparable between both groups with the same surgical and anaesthetic team
**Conclusion(s):** Entropy monitoring for hepatic patients reduced general anaesthetic agent consumption during induction and surgery and enhanced recovery. Encouraging the use of Anaesthesia depth monitors can have an important economic impact when applied on a larger scale.

## 01AP17-4

### Analgesia nociception index is more sensitive than the bispectral index in pain stimulation

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**Background and Goal of Study:** Anesthetic depth is an obscure term, and difficult to define. Conventionally, the bispectral index (BIS), which is used for monitoring the depth of anesthesia, can detect cortex activity. The analgesia nociception index (ANI) is for monitoring changes in pain in the autonomic nerve system.
We compared the sensitivity of the ANI and BIS during surgery while pain from sources such as intubation or incision was stimulated .
**Materials and methods:** Sixty- patients received scheduled surgery with American Society of Anesthesiologists Classification I or II . The patients were aged 20-80 years and all had a BMI below 30. After receiving general anesthesia, the patients underwent BIS and ANI monitoring to allow us to observe the change at 3 time points. The 3 time points were under intubation (from 1 min before intubation to 2 min after intubation), after intubation (from 2 min after intubation until incision) and 3 min into surgery (the first 3 min after incision). ANI values in the range of 0-100 points (lower values indicate higher levels of pain) and BIS values in the range of 0-100 points (higher values indicate

considerably higher level of consciousness) were recorded simultaneously.
**Results and discussion:** 28 patients received intubation, 24 received supraglottic airway devices (SADs), and 8 received intravenous anesthesia (IVG). The after intubation condition was used as a control because was no stimulation was present at this time point; under intubation and 3 min into surgery were operationalized as experimental groups. ANI values were lower in the under intubation and 3 min into surgery conditions than in the after intubation condition for both the intubation and SAD groups. However, the BIS values were unchanged in both the under intubation and 3 min into surgery conditions. Unexpectedly, in the IVG group, the median ANI value at 3 min into surgery was higher than that measured before surgery (no pain stimulation).
**Conclusion(s):** The ANI was more sensitive to pain stimulation than was the BIS. Of particular interest, the IVG group ANI values were higher at 3 min into surgery than they were before surgery. The reasons for this could be the short duration of surgery, but this hypothesis requires further surveying for confirmation.

## 01AP17-5

### Propofol effect-site concentration, bispectral index and spectral entropy as guides for propofol sedation during spinal anesthesia

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**Background and Goal of Study:** To study the correlation between, propofol effect-site concentration (Ce prop), Bispectral Index (BIS) and Spectral entropy (state/response, SE/RE), as well as to investigate their threshold values best to detect desired level of propofol sedation, during spinal anesthesia.
**Materials and methods:** Under aseptic conditions, and after fixation of standard monitors combined spinal-epidural block was performed by staff-grade anesthesiologists, using a standard midline approach in the sitting position at the L3-L4 or L4-L5 intervertebral space. A dose of 12.5 mg hyperbaric bupivacaine was injected into the subarachnoid space and the epidural catheter was threaded into the same space. After confirmation of successful spinal block, propofol sedation using target-controlled infusion (TCI) was started at 0.5 $\mu$g/ml and increased incrementally by 0.5 $\mu$g/ml. Depth of sedation was evaluated using The Observer's Assessment of Alertness and Sedation (OAA/S) score, as well as, BIS, SE and RE every 5 min after each Ce prop equilibrium.
**Results and discussion:** The changes of Ce prop. significantly correlated with the changes of BIS, SE and RE values. All are significantly correlated with the changes in the OAA/S score. The cut-off values for Ce prop., BIS, SE and RE corresponding to the desired level of propofol sedation were, 1$\mu$g/ml, 75, 75 and 85 respectively. SE showed significant higher specificity while Ce prop showed the lowest specificity at the level of 100% sensitivity. This finding confirmed the result of Kwon et al [1] Who stated that the Ce prop should not guide the sedation depth alone, because at the same level of Ce prop, patients displayed different levels of sedation score.
**Conclusion:** During spinal anesthesia under propofol sedation, BIS, SE, RE and Ce prop. were equally correlated with OAA/S score. At 100% level of sensitivity, SE showed the highest specificity whereas the Ce propofol had the lowest specificity to detect the desired level of sedation and should not be used as a principle guide of propofol sedation.
**References:**
1. Kwon MY, Lee SY, Kim TY, Kim DK, Lee KM, Woo NS, Chang YJ, Lee MA. Spectral entropy for assessing the depth of propofol sedation. Korean J Anesthesiol. 2012; 62:234-9.
2. Iannuzzi M, Iannuzzi E, Rossi F, Berrino L, Chiefari M. Relationship between Bispectral Index, electroencephalographic state entropy and effect-site EC50 for propofol at different clinical endpoints. Br J Anaesth. 2005; 94:613-6.

## 01AP17-6

### Association of apolipoprotein ε4 with postoperative cognitive dysfunction and long-term memory in elderly patients undergoing general anesthesia

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**Background and Goal of Study:** Postoperative cognitive dysfunction (POCD) POCD is related to many factors such as physical status, drugs, advanced age, Alzheimer disease, and abnormalities in function and metabolism of the brain. The apolipoprotein E (APOE) ε4 allele is associated with episodic memory decline and risk for Alzheimer's disease. This study investigated the association between APOE ε4 genotype and POCD in patients undergoing general anesthesia to evaluate whether APOE genotype was linked with either initial or change in performance on a range of cognitive tests, after surgery.
**Materials and methods:** A total of 126 elderly patients submitted to surgical procedures and general anesthesia had cognitive function assessed previously to the procedure and after 3 and 180 days follow-up assessment. The neuropsychological test battery used was: TICS, RAVLT, STROOP, TMT A/B and SDMT. The APOE was genotyped.
The primary outcome was an evaluation of each battery test score and the frequency distribution of apolipoprotein E alleles and genotypes. $P < 0.05$ was used as statistically significant.
**Results and discussion:** The Pairwise comparisons with Bonferroni correction disclosed among test battery used and APOE alleles 2, 3 and four the following results. General cognitive function, assessed by TICS showed differences between alleles 2 and 4 and alleles 3 and 4 on 3$^{rd}$ and 180$^{th}$ day after anesthesia. The mean difference, SE, P and 95% CI were respectively: 5.54, 1.72, 0.005 and 1, 37-9.70 and 5.49,1.17, <0.001 and 2.66-8.33 for TICS on the 3$^{rd}$ day; 4.38, 1.45, 0.009 and 0.87-7.89 and 4.28, 0.99, <0.001 and 1.85-6.63 on the 180$^{th}$ day. Concerning Long-term memory, the RAVLT-D on the 3$^{rd}$ day after anesthesia showed the difference between allele 3 and 4. They were 3.32, 0.84, <0.001 and 1.27-5.36.
Also, the RAVLT-D on day 180 after anesthesia presented differences between alleles 2 and 4 and 3 and 4; 4.28, 1.10, 0.0001 and 1.60 - 6.96 and 2.25, 0.75, 0.01 and 0.43-4.08 respectively. Memory tests associated with APOE ε4 carriers ($P<0.001$). There might be a moderate negative relationship between APOE ε4 carriers and long memory
**Conclusion(s):** POCD can suggest a cognitive decline onset especially in long-term memory in APOE ε4 carriers' elderly adults. In future studies, we could evaluate its use previously to the general anesthesia for application of some preventive measures with those patients, like neurostimulation before the procedure.

## 01AP17-7

### BIS and burst suppression in a patient with hemorrhagic shock

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**Background:** Based on four EEG parameters, the bispectral index (BIS) monitor measures depth of anesthesia on a scale between 0 (isoelectric) and 100 (wake state). BIS and burst suppression (BSR) are influenced by many factors, such as changes in the depth of anesthesia, hypothermia and brain hypoperfusion. Due to the direct correlation between BSR and cerebral distress[J1] , many anesthesiologists use BIS devices to monitor brain perfusion.
**Case report:** Surgery was indicated for a 70-year old woman (52 kg, 155 cm, P2), to resection of a large tumor in contact with the pancreas. The preoperative laboratory findings were normal. The patient was awake upon admission to the surgery room. Monitoring included oximetry, invasive blood pressure, ECG and BIS. Thoracic epidural blockade was achieved with ropivacaine (30 mg) combined with sufentanil (20 $\mu$g) and morphine (2 mg) followed by general anesthesia with sufentanil (15 $\mu$g), cisatracurium (3 mg) and target-controlled remifentanil and propofol (all i.v.), to attain BIS 45-60. The resection of the tumor (which invaded the vena cava) precipitated intense bleeding, leading to shock.
Fluid resuscitation was achieved with crystalloids, colloids, hemoderivatives and noradrenaline. BIS fell gradually to 7 and BSR rose to 84. Having achieved

hemodynamic stability by the end of the procedure, the intubated patient was transferred to the ICU. On the 6th postoperative day, without sedation the patient presented isocoria, photo reactivity and spontaneous eye opening, but did not interact with the examiner. Sepsis and bleeding developed and the patient died on the 10th postoperative day.
**Discussion:** The low BIS and high BSR values observed during hemorrhagic shock may be considered predictive of coma, as observed after the first surgery. The direct correlation between BIS values and chances of recovery of awareness in patients with severe brain damage is well documented. High BSR values have also been associated with brain hypoperfusion.
**Reference:** Suárez FEF, Tamargo LA, Álvarez AG. Cambios en el índice biespectral (BIS) em uma parada circulatória durante la circulación extracorpórea, Rev Esp Anestesiol Reanim. 2011;58:261-263.
**Learning points:** The observed changes in BIS and BSR values probably reflected severe neurological damage.

## 01AP17-8

### Deep total intravenous anesthesia reduced the incidence of early but not long-term cognitive dysfunction in the elderly

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**Background and Goal of Study:** The elderly are at significant risk for Cognitive dysfunction . But the effect of the depth of anesthesia on POCD remains controversial. This study is designed to investigate whether the depth of anesthesia affects the incidence of POCD.
**Materials and methods:** 357 patients aging between 50 and 70 were randomly divided into 2 groups: deeper anesthesia (n = 181) and lighter anesthesia (n =176). Elderly patients who are going to receive moderate laparotomic operations for the first time are selected (including gastrectomy, gastric cancer, colon resection, urinary calculi types of surgery, hysteromyomectomy). The operative time is expected to be in 90-150 min, and the amount of bleeding is less than 500 ml. Total intravenous anesthesia was used. Propofol and sufentanil were used for anesthesia induction and propofol and remifentanil infusion rate titrated to maintain target BIS values. BIS is maintained in 35-45 in deeper anesthesia group and 50-60 in lighter anesthesia group. A battery of 9 neuropsychologic tests (cumulative learning, verbal fluency, association test, digit span(forward and backward), digit symbol, trail making test, grooved pegboard test(favored and non-favored hand)) was administered preoperatively , 7days and 3 months after surgery. A postoperative deficit was defined as a postoperative decrement to preoperative score greater than 1 standard deviation on any test. Patients who experienced 2 or more deficits were deemed to have early postoperative cognitive dysfunction(POCD).
**Results and discussion:** 281 patients completed testing, of which 142 were in deeper and 139 in the lighter group. The early(7days) POCD occurred in 23 patients (16.2%) in the deeper group and in 45 patients (32.3%) in the lighter group. The long-term(3 months) POCD occurred in 19 patients (13.3%) in the deeper group and in 17 patients (12.2%) in the lighter group. The difference in incidence of POCD between deeper and lighter group is statistically significant ($P=0.0015$, $X^2$ ) at 7days but not at 3 months ($P=0.7527$ $X^2$).
**Conclusion:** Deeper total intravenous anesthesia can decrease the incidence of cognitive dysfunction in the early(7days) postoperative period but had no significant effect on long-term(3 months) cognitive dysfunction.
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## 01AP17-9

### Can cerebral oxigenation reflect blood loss?

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**Background and Goal of Study:** Cerebral oximetry estimates the oxygenation of cerebral cortex by a non-invasive transcutaneous measurement using near-infrared spectroscopy (NIRS). Although It has been used to detect cerebral ischemia, its utility to monitor blood loss is yet to be confirmed [2,3]. We propose a novel concept by using normoxic challenges (reducing $FiO_2$ from 50% to 21%) to study if cerebral oxygenation (cerebral $rSO_2$) changes induced by the challenges can reflect the amount of blood lost.
**Materials and methods:** We prospectively studied 10 patients undergoing total hip replacement surgery and monitored, by INVOS, the variation of cerebral $rSO_2$ along the normoxic challenges taken each 30 minutes. Serial arterial gasometries were obtained and heart rate (HR), mean arterial pressure (MAP), $EtCO_2$ and BIS were also monitored and registered. Blood loss was estimated. Institution board approval and informed consent were obtained.
**Results and discussion:** Three normoxic challenges were performed in 82% of the patients, with a total of 31 challenges. HR ($p=0,245$), MAP ($p=0,599$), $EtCO_2$ ($p=0,169$), BIS ($p=0,071$), $SpO_2$ ($p=0,542$), thenar eminence $rSO_2$ ($p=0,573$) and cerebral $rSO_2$ ($p=0,649$) did not change while the patient was positioned in lateral decubitus and before each challenge. We found a correlation between the consecutive challenges and the fall of cerebral $rSO_2$ ($p=0,01$). Estimated blood loss increased with the lengths of the surgery ($p<0,001$) and there was correlation with cerebral $rSO_2$ variation ($p=0,002$). Cerebral rSO2 with 50% $FiO_2$ did not change during the surgery. Hemoglobin value did not correlate with any parameter.
**Conclusion(s):** Performing normoxic challenges gave additional clinical information as it showed the cerebral perfusion state without the contaminant factor of the high $FiO_2$ related to the current practice of general anesthesia. We found a correlation between the amount of blood loss and the decrease of cerebral $rSO_2$, and although there was no decrease in hemoglobin measurements, we hypothesize that it was caused by blood loss.
**References:**
1. Ferari M, Principles, techniques and limitations of near-infrared spectroscopy, Can J Appl Physiol. 2004; 29,
2. Murkin JM, Near-infrared spectroscopy as an index of brain and tissue oxygenation, BJA, 2009;103,
3. Torella F, Cerebral and peripheral oxygen saturation during red cell transfusion, J Surgical Research,2003;110

## 01AP17-10

### Analysis of blood pressure courses as a predictor of worse neurological outcome after anesthesia

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**Background and Goal of Study:** Automatic monitoring of vital parameters accumulates particularly high-density information resources that could be valuable for detecting and quantifying temporary dysregulation. Intraoperative hypotension - as a predictor of perioperative morbidity - is commonly interpreted in mean arterial pressure (MAP) time below a certain threshold (1). Since time series characteristically combine a course of values with associated timestamps, we set out to simultaneously aggregate the severity and the duration of hazardous episodes, and to quantify short-term fluctuations.
**Materials and methods:** We investigated short-term fluctuation, slow-moving variability, or unipolar derailment of perioperative blood pressure.
Therefore we used Poincaré diagrams (2), a 'hypotensive index' in analogy to (3), and conventional timestamp-agnostic measures of dispersion on 30,641 de-identified perioperative MAP series.
We analyzed the statistical associations between these variables, and compared their distribution between patients with (3,041) or without postoperative neurological morbidity accounted by computed tomography or magnetic resonance imaging of the head.

**Results and discussion:** Comparative analysis demonstrated that patients with a documented tomography of the head had significantly elevated measures of short-term MAP fluctuations ($p<.001$). This cohort also trended towards hypotensive episodes, in the sense that among patients with a presumed adverse neurological outcome the 'hypotensive index' was increased in seven of twelve monthly subsets. Conventional time-agnostic measures of dispersion like the standard deviation of MAP values also tended to be increased among patients with a head tomography, although the association seemed less pronounced and less reliable than the one of the specialized gradient-based metrics.
**Conclusion(s):** The findings of this study have two implications: First, we provide a robust methodological approach to quantitatively analyze perioperative blood pressure time series.
Second, we demonstrated that the impact of short term fluctuations of blood pressure may be more important for postoperative outcome than the absolute value.
We presume that such automated analyses of clinical time series could feasibly serve as a valuable component of diverse electronic medical records-based studies.
**References:**
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2. Golińska et al. 2013;
3. Vogelzang et al. Crit Care 2004

## 01AP17-11

### Insufficient astrocyte-derived BDNF contributes to propofol-induced neuron death through Akt/GSK3β/ mitochondrial fission pathway

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**Background and Goal of Study:** Propofol causes neuron death in developing animals and there is little information regarding the role of astrocytes. Relative numbers of astrocytes to neurons are much less in neonatal rodent brains compared with adults. We hypothesize that insufficient levels of astrocyte-derived brain-derived neurotrophic factor (BDNF) may contribute to propofol-induced neuron death.
**Materials and methods:** Hippocampal astrocytes and neurons isolated from neonatal rats were either cultured alone or co-cultured at 1:9 and 1:1 ratios. The cultures were treated with propofol
(3, 10, or 30 $\mu$M) for 6 h with BDNF, TrkB inhibitor Cyclotraxin-B, GSK3β inhibitor CHIR99021, or mitochondrial fission inhibitor Mdivi-1. Cell death was measured by propidium iodide staining. BDNF concentration in astrocyte-conditioned medium was quantified using ELISA. Western blot was performed for Akt and GSK3β assay. Mitochondrial shape was visualized through TOM20 staining.
**Results and discussion:** Propofol (10 and 30 $\mu$M) increased cell death, mitochondrial fission, and activated GSK3β; and decreased activated Akt in neurons, but did not influence astrocyte viability. The neuron death was attenuated by co-culturing with astrocytes at high-density (1:1) but not low-density (1:9). Administration of BDNF, CHIR99021, or Mdivi-1 prevented the increases of cell death and mitochondrial fission of neurons in neuron-alone cultures and 1:9 co-cultures. Blocking BDNF receptor and Akt activities abolished astrocyte-induced neuroprotection.
**Conclusion(s):** We demonstrate for the first time that 1) astrocytes are more resistant to propofol than neurons and 2) insufficient BDNF secretion, due to low-density of astrocytes, contributes to propofol-induced neuron death through Akt/GSK3β/mitochondrial fission pathway, suggesting potential neuroprotective strategies against propofol such as administration of BDNF or astrocyte-conditioned medium, decreasing mitochondrial fission, or inhibiting GSK3β.

## 01AP18-1

### Effect of different REMI effect site concentrations on the BIS, qCON, ANI, and qNOX at constant NSRI

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**Introduction:** Anesthetic depth is the probability of hypnotic + opioid induced hypnosis, immobility and hemodynamic control. The NSRI (Noxious Stimulus Response Index) is a composite index of these endpoints, and hypnotics/opioid combinations that attain identical NSRI's (points on the same isoboles) attain the same probability of a certain anesthetic depth. Another approach is to separately titrate hypnotics to an EEG derived index (BIS/Covidien], qCON/ QuantiumMedical) and opioids to an anti-nociception index (ANI/MDoloris, qNOX/QuantiumMedical).
We examined whether these indices correlated with 3 different remifentanil effect site concentrations (CeREMI) when the hypnotic concentration was adjusted to maintain NSRI constant in a homogenous patient (pt) population under constant stimulus intensity.
**Methods:** After obtaining IRB approval and pt consent, 10 pts undergoing robot prostatectomy received desflurane (DES) in $O_2$/air and REMI. Using the SmartPilot (Dräger), CeREMI in each pt was increased from 1 to 3 to 5 ng/ mL while $F_A$DES (end-expired desflurane %) was adjusted to keep NSRI at 5. Once NSRI and DES had stabilized at the new CeREMI, BIS, qCON, ANI and qNOX were collected every 5 sec for 20 min, and their median, first and third quartile, mean, standard deviation and coefficient of variation over these 20 min calculated. The effect of different CeREMI on each index (ANOVA), and the prediction probability (Pk) for ANI and qNOX for CeREMI as well as BIS and qCON for CeDES were calculated [1].
**Results:** S See Fig 1. Age, height, and weight were 63±7 y, 174±6 cm, and 81±15 kg. The $F_A$DES % to maintain NSRI at 5 was 6.5±0.3, 4.0±0.2, and 3.0±0.1 % in the Ce1, Ce3, and Ce5 groups, respectively.

| | CeREMI (microg/mL) | | | ANOVA on ranks |
|---|---|---|---|---|
| | 1 | 3 | 5 | |
| ANI | 70 (54 - 83) | 58 (48 - 67) | 51 (45 - 63) | P<0.05, all groups differ |
| qNOX | 47 (37 - 59) | 32 (27 - 41) | 30 (18 - 40) | P<0.05, all groups differ |
| BIS | 44 (40 - 48) | 49 (45 - 53) | 55 (50 - 59) | P<0.05, all groups differ |
| qCON | 40 (37 - 44) | 37 (34 - 41) | 36 (30 - 41) | P<0.05, all groups differ |

| | Pk of index versus CeREMI | | Pk of index versus $F_A$des | |
|---|---|---|---|---|
| | Pk | N | Pk | N |
| ANI | 0.38 (0.01) | 2230 | | |
| qNOX | 0.78 (0.008) | 2000 | | |
| BIS | | | 0.32 (0.008) | 1992 |
| qCON | | | 0.67 (0.007) | 1992 |

*[Fig. 1. Median (first and third quartiles) of each parameter for each remifentanil effect site concentration (CeREMI) average over the 20min period Ce was held constant, for each index, values differed between different CeREMI. Pk is the prediction probability of the index versus CeREMI. For positive correlation, the value is 1 when the index predicts the observed effect (i.e. CeREMI), while 0.5 indicates the index does not better predict than chance. A value below 0.5 means the index increases as CeREMI increases. Pk presented as mean (standard error). $F_A$des = end-expired desflurane concentration]*

**Discussion:** ANI did not reflect opioid effect because ANI is supposed to increase with increasing CeREMI; qNOX performed better in this regard. BIS and qCON were similar in the 3 CeREMI groups, reflecting their ability to estimate the depth of anesthesia.
**References:** 1. Smith W et al. Anesthesiology 1996;84:38-51

## 01AP18-2

### Apnea as clinical indicator for tracheal intubation without curarization in pediatric patients

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Many articles have been published about tracheal intubation in children using sevoflurane without muscle relaxant (1). None of the study showed 100% excellent intubating conditions. Our study aimed to achieve apnea based on induction time using sevoflurane before intubation and observe the intubating conditions and hemodynamic variations in pediatric patients posted for ophthalmic procedures under general anaesthesia (1).

**Materials and methods:** A systematic multicentric review of our recorded data was analyzed. 150 patients patients aged 1-6 years ASA I-II were induced with sevoflurane in 100% oxygen with 7 L/min flow via facemask. Fentanyl 1 mcg/kg was given intravenously. Induction was done in slow incremental manner up to 8 vol% for 4.5 min (0 vol% to 8 vol% over 2.5 to 3 minutes). Propofol 1 mg/ kg was given intravenously at 4.5 min. Ventilation by mask was controlled after achieving apnea based on capnography and respiratory pattern. Laryngoscopy and tracheal intubation was performed at 5.5 minutes. Intubating conditions were assessed using Steyn's modification of Helbo-Hansen scoring system and hemodynamic parameters were measured at 0, 3, 4.5, 5.5 and 6.5 minutes after induction.

**Results and discussion:** 96 out of 150 patients achieved apnea at 4.5 min and all 150 patients after giving propofol 1 mg/kg. Intubating conditions were excellent in all the cases without any complications. There was decrease in HR at 5.5 min compared to 3 min. There was decrease in systolic and diastolic blood pressure at 3, 4.5 and 5.5 minute intervals when compared to baseline value at 0 min (at 5.5 minutes was 15.58% and 12.75% compared to baseline respectively) (Table 1).

| | | Mean ± SD | p value | P value (3min) |
|---|---|---|---|---|
| **Systolic Blood Pressure** | 0 min | 91.52 ± 8.66 | | |
| | 3 min | 88.54 ± 7.90 | 0.0020 | |
| | 4.5 min | 85.55 ± 7.45 | 0.0001** | 0.0008 |
| | 5.5 min | 77.26 ± 7.15 | 0.0001** | 0.0001 |
| | 6.5 min | 81.30 ± 7.29 | 0.0001** | 0.0001 |
| **Diastolic Blood Pressure** | 0 min | 51.68 ± 8.78 | | |
| | 3 min | 50.36 ± 7.62 | 0.1654 | |
| | 4.5 min | 59.53 ± 86.12 | 0.2676 | 0.1959 |
| | 5.5 min | 45. 09 ± 6.71 | 0.0001** | 0.0001 |
| | 6.5 min | 47.01 ± 6.75 | 0.0001** | 0.0001 |

*[Table 1. In the study it was observed that there was significant decrease in Systolic and Diastolic blood pressure at all the intervals when compared to baseline value at 0 min. Percentage decrease in SBP at 5.5 min = 91.52 - 77.26 / 91.52 = 15.58%. Percentage decrease in DPB at 5.5 min = 51.68 - 45.09 / 51.68 = 12.75%]*

**Conclusions:** Apnea and excellent intubating conditions were observed in all the patients without any complications during induction with sevoflurane of 8 vol% by 5.5 minutes before laryngoscopy and tracheal intubation.

**Reference:**

1. Rajan S et al.Evaluation of endotracheal intubating conditions without the use of muscle relaxants following induction with propofol and sevoflurane in pediatric cleft lip and palate surgeries. J Anaesthesiol Clin Pharmacol 2014;30:360

## 01AP18-3

### The half maximal effective dose of intravenous oxycodone for blunting the hemodynamic responses to laryngoscopy and endotracheal intubation

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**Background and Goal of Study:** Laryngoscopy and endotracheal intubation lead essentially to undesirable hemodynamic changes, which most anesthesiologists have attenuated by pharmaceutical intervention such as opioid and non-opioid analgesics. Intravenous oxycodone also can be used for this purpose, but it has different effective dose according to gender as well as age. However, there are no references on the optimal dose to attenuate these hemodynamic changes.

Therefore, we investigated the half maximal effective dose ($ED_{50}$) of intravenous oxycodone to blunt the hemodynamic responses to laryngoscopy and endotracheal intubation by the Dixon's up-and-down method in male patients.

**Materials and methods:** After institutional review board approval, thirty three male patients, aged between 20 and 65 years, were finally enrolled. First patients were slowly injected with intravenous oxycodone 0.1 mg/kg 20 minutes before anesthesia. The induction of anesthesia and neuromuscular block was started with propofol and rocuronium. And then, 2 minutes later, endotracheal intubation was performed. The dose of intravenous oxycodone for each subsequent patient was determined by the response of the previous patient by the Dixon's up-and-down method (DUDM) with an interval of 0.01 mg/kg according to the degree of hemodynamics changes with 20% limitation 1 min after intubation. The $ED_{50}$ of intravenous oxycodone was determined by using Dixon up-and-down method which calculating the mean of midpoint dose of all independent pairs of patients who manifested crossover from "response" to "no response" after eight crossover points. Probit regression model was used to calculate dose response curve and confidence intervals and estimated $ED_{50}$ and $ED_{95}$ were calculated.

**Results and discussion:** The$ED_{50}$of intravenous oxycodone was 0.074 ± 0.008 mg/kg in male patients by DUDM. From probit regression model, the $ED_{50}$ and $ED_{95}$ of intravenous oxycodone were 0.069 [95% confidence interval (CI), 0.06-0.077] and 0.091 (CI, 0.077-0.129) mg/kg in male patients, respectively.

**Conclusion(s):** The intravenous oxycodone showed the narrow preventive dosage for blunting hemodynamic response to laryngoscopy and endotracheal intubation, and the additional study will be needed to confirm the actual blunting effect of hemodynamic responses to laryngoscopy and endotracheal intubation using the $ED_{50}$ and $ED_{95}$ of intravenous oxycodone.

## 01AP18-4

### Intermediate care unit length of stay: differences in patients undergoing carotid endarterectomy

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**Background and Goal of Study:** Recent studies show that hospital length of stay for more than 2 days in patients submitted to carotid endarterectomy (CEA) is associated with symptomatic carotid disease, heart failure and pulmonary disease. Electroencephalography changes, time of surgery, transfer to intensive care unit and number of postoperative complications were also identified as predictors of prolonged stay.
A preliminary analysis in our center revealed that the majority of patients undergoing CEA is admitted in the intermediate care unit being discharged during the first 24h after surgery. Our aim was to identify differences between these patients and those with a prolonged stay in this unit.
**Materials and methods:** Retrospective analysis of data from consecutive patients submitted to CEA between July 2012 and December 2014 in our center. Data were collected from medical electronic records: demographics, comorbidities, intraoperative variables, post anaesthesia care, postoperative complications and postoperative length of stay were registered. Patients were included in two groups according to intermediate care unit length of stay after surgery: ≤24h or >24h. Statistics: ANOVA, t-student and chi-square tests were used. A p-value <0.05 was considered statistically significant.
**Results and discussion:** 135 patients were admitted in the intermediate care unit: 77 were discharged in ≤24h and 58 after 24h. No differences in demographics and comorbidities. There were also no differences in indications for surgery and extension of carotid disease. All patients underwent general anaesthesia. Anesthetics, cerebral monitoring devices, intraoperative cardiovascular drugs and time of surgery were similar between groups. Patients with a shorter intermediate care unit length of stay had a shorter time until discharge (≤24h: 195±145; >24h: 272±223) in the post anesthesia care unit (PACU) (p=0,033) and the use of cardiovascular drugs in the PACU was less frequent (p=0,001). Difference in the number of postoperative complications was also significant (p<0,001). Use of cardiovascular drugs in the PACU was also associated with the number of postoperative complications (p=0,001).
**Conclusion(s):** Hemodynamic stability and a shorter stay in the PACU may be indicators of postoperative level of care, risk of complications and length of stay in these patients.

## 01AP18-5

### Risk factors for pulmonary complications after percutaneous nephrolithotomy

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**Background and Goal of Study:** Although percutaneous nephrolithotomy (PNL) was established as a minimally invasive treatment option for removal of renal stones, it is known to be associated with several complications including extravasation of fluid and urine, blood transfusion, and septicemia. However, little is known about postoperative pulmonary complications (PPCs) in PNL. We therefore evaluated the incidence, risk factors, and outcomes of PPCs in PNL.
**Materials and methods:** After Institutional Review Board approval (approval number: 2014-0975), we retrospectively reviewed the clinical and laboratory data from 959 patients who underwent PNL. The definition of PPCs was performed according to the criteria presented by Hulzebos et al.[1] We evaluated preoperative variables such as age, gender, comorbidities, and laboratory findings, stone characteristics such as count, size, location, and composition, and approach technique. We also evaluated postoperative outcomes.
**Results and discussion:** Patients who underwent PNL more than twice were excluded. Patients with incomplete data were also excluded from the analysis. Ultimately, 560 patients of PNL were included in this study. Of these, 158 patients (28.2%) had PPCs. Patients with PPCs were significantly older than those without PPCs ($P = 0.022$). The gender, body mass index, comorbidities, and preoperative laboratory findings did not significantly differ between the two groups. Use of intravenous patient controlled analgesia, large sized stone over 25 mm in diameter, multiple stones, use of intercostal approach, and uric acid stone were significantly associated with the incidence of PPCs. In addition, the duration of postoperative hospital stay was significantly longer in patients with PPCs than in those without PPCs ($P = 0.004$).
**Conclusion:** We found that old age, use of intravenous patient controlled analgesia, multiple stones, large sized stone, and intercostal approach were associated with the development of PPCs. These findings provide valuable insights into improving perioperative management in PNL.
**Reference:**
1. Hulzebos EH, Helders PJ, Favie NJ, et al. Preoperative intensive inspiratory muscle training to prevent postoperative pulmonary complications in high-risk patients undergoing CABG surgery: a randomized clinical trial. JAMA 2006;296:1851-7

## 01AP18-6

### Which provides better postoperative recovery or quality of life after laparoscopic surgery, fentanyl or remifentanil?

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**Background and Goal of Study:** Both fentanyl and remifentanil are commonly used opioids in laparoscopic surgery. Compared to fentanyl, remifentanil provides strong analgesia, which probably leads to less secretion of cortisol during the surgery. Meanwhile, administration of glucocorticoids before surgery has shown to improve the postoperative recovery.
We therefore hypothesized that the higher level of cortisol by using fentanyl, the better postoperative recovery or quality of life.
**Materials and methods:** The study was prospective, randomized, controlled, double (patients and investigators) blinded clinical trial. ASA PS 1 and 2, age 20 to 79 years old patients undergoing renal or ureteral laparoscopic surgery were enrolled. Subjects were randomized to receive fentanyl or remifentanil as a part of standardized anesthetic. Both groups received intravenous patient-controlled anesthesia with fentanyl as postoperative analgesia. Cortisol was measured 4 times: before, during, at the end of the surgery, and next morning. Primary outcome was Quality of Recovery (QoR)-40 score on 24 hours after the surgery. Secondary outcome were 36-Item Short-Form Health Survey (SF-36) scores in 1 and 3 months after the surgery. Sample size calculations revealed 66 subjects were required to achieve a power of 80% with a type 1 error of 0.05.
**Results and discussion:** 70 subjects were randomized and primary outcome data were available for 63 subjects. Patients' baseline characteristics were not significantly different between the groups.

| | Fentanyl (n=34) | Remifentanil (n=35) | p value |
|---|---|---|---|
| Age (yr) | 52.0 (39.8-66.3) | 52.0 (42.0-64.0) | 0.884 |
| Sex (M:F) | 23:11 | 24:11 | 1.000 |
| Height (m) | 1.66 (1.61-1.70) | 1.65 (1.58-1.76) | 0.727 |
| Weight (kg) | 63.1 (52.7-70.6) | 67.0 (53.1-75.2) | 0.525 |
| ASA PS (1:2) | 13:21 | 10:25 | 0.450 |

*[Table 1]*

Global median (IQR) QoR-40 score was higher in the fentanyl group [160 (138-177)] compared with the remifentanil group [140 (127-166)], however this difference did not reach statistical significance (p=0.079). There were no significant differences in SF-36 scores. Cortisol measured during and at the end of the surgery was significantly higher in the fentanyl group (p<0.001).
**Conclusion:** Fentanyl may have better quality of recovery than remifentanil. However, this difference did not reach statistical significance, probably because our sample size did not reach the target sample size. Further well-powered studies are needed to clarify our hypothesis.

## 01AP18-7

### Neostigmine: a safe and simple solution to acute colonic pseudo-obstruction

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**Background:** Acute colonic pseudo-obstruction (ACPO), or Ogilvie syndrome, is characterized by a massive colonic distension without mechanical obstruction. Pathophysiology is unclear, being mainly an altered intestinal motility due to a disorder of the autonomous sytem. Prompt treatment and resolution are prioritary. In this case report medical treatment was performed, based on physiology and pharmacology.
**Case report:** A 40-year-old man, with a history of spastic tetraparesis due to cerebral palsy and chronic constipation requiring weekly enemas, was admitted to the hospital after 3 days of general discomfort without fever. Dehydration, bloating and a distended abdomen were noted, with no hemodynamic or respiratory instability. Blood tests were normal. Abdominal x-ray revealed significant colonic dilatation. Due to scarce improvement with conservative treatment, and a control x-ray showing further small bowel and gastric distention, neostigmine was indicated. Under standard monitorisation and with ready access to advanced resuscitation equipment, neostigmine was titrated according to clinical response up to a total of 3.5mg. Progressive bradycardia from 78 to 47bpm with no hemodynamic instability was observed, with an increase of salivary secretions. Effectivity was noted by the passing of two pasty stools. After 2 days, nasogastric tube could be removed, with correct oral intake and radiological improvement.
**Discussion:** ACPO is thought to be due to a deficiency in the parasympathetic autonomic nervous system, responsible of gut inervation. Neurological diseases, as in our case, have been associated to this syndrome. The most feared complication is cecal perforation and peritonitis, associated with mortality rate close to 70%. Initial treatment is conservative, including bowel rest, opioid discontinuation, correction of electrolyte imbalances and underlying infection, and nasogastric and rectal tubes. Neostigmine increases the amount of available acetylcholine, indirectly stimulating muscarinic receptors in the smooth muscle of the digestive system, causing contraction. However, side effects are not restricted to the intestine, being the most important the risk of bradycardia and cardiac arrest, thus strict monitoring is required.
**References:**
Ann R Coll Surg Engl. 1992 Sep;74(5):364-7
Ann Med Surg. 2014 Jun 19;3(3):60-4
J Am Coll Surg. 2000 Mar;190(3):315-8
**Learning points:** Monitored use of neostigmine, is a simple, safe, and effective treatment for ACPO.

## 01AP18-8

### Sulfate magnesium as an option to treat hipertensive crisis in resection of metastasic pheochromocytoma

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**Background:** Pheochromocytoma is a reare tumor with low incidence of osseus, hepatic and pulmonary metastasis. When handling the tumor a massive release of catecholamine occurs, with secondary difficult to treat high blood pressure (BP).
**Case report:** A 32 years old, ASA II male patient was scheduled for resection of humeral metastasis of malignant pheochromocytoma and prosthetic reconstruction. The primary adrenal focus was uneventfully resected 8 years before.
The patient received doxazosin 4mg/24h and propranolol 10mg/8h over 14 days prior to surgery. Invasive femoral BP before induction was 126/83 mmHg. After uneventfull induction wih propofol 3mg/kg, fentanyl 3mcg/kg and rocuronium 0.6mg/kg, maintenance was achieved with desflurane and remifenatnil *Target Controlled Infusion*. Tumor dissection produced a sharp rise in BP of 230/138 mmHg.
We administered labetalol 70mg iv and magnesium sulfate 6g, followed by central-line perfusion of labetalol 300mcg/kg/min, magnesium sulfate 1g/h and nitroglycerin 0.3mcg/kg/min to maintain BP below 160/90 mmHg. After tumor removal, aggressive fluid resuscitation and norepinephrine infusion (0.04mcg/kg/min) were needed due to deep hypotension. The patient was extubated in the OR and transferred to the postanaesthesia care unit haemodynamically stable. He was discharged after 17h.
**Discussion:** Humeral metastasis behaved similarly to the primary adrenal pheochromocytoma. Neither magnesium sulfate nor labetalol or nitroglycerine have showed benefits over other drugs to treat hypertensive crisis. Magnesium sulfate was the most effective one in our patient. Safety of intravenous compared to inhalatory maintenance has not been proven safer. A regional technique may reduce the pain-related catecholamine release. We advocate for a combined anesthetic technique whenever possible.
**References:**
Ajallé R. Treatment of malignant pheochromocytoma. Horm. Metab. Res 2009;41(9):687-96.
Dortzbach K. Variants of pheochromocytoma and their anesthetic implications: a case report and literature review. M. E.J. Anesth 2010;20(6):897-905.
**Learning points:**
- Bone metastatic pheochromocytoma deserves similar anesthetic approach because of similar hypertensive crisis risk than adrenal pheochromocytoma.
- Magnesium sulfate is a good option in this setting

## 01AP18-9

### The effect of sevoflurane and propofol anesthesia on incidence of perioperative hyperglycemia in diabetic patients undergoing lung surgery

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**Background and Goal of Study:** Propofol has shown less increase in blood glucose level during surgery compared to inhalational anesthetics in surgical patients, but the effect of different anesthetic agents on postoperative glycemic control remained undefined**.** This study aimed to compare effects of anesthetic agents on development of perioperative hyperglycemia in diabetic patients undergoing lung surgery.
**Materials and methods:** A retrospective chart review was conducted with 168 type II diabetic adult patients undergoing elective lung surgery between January 2008 and May 2015 at a single center.
Patients were classified into two groups based on anesthetic agents used to maintain general anesthesia: propofol (group P, n = 85) and sevoflurane (group S, n = 83). The primary endpoint was the incidence of perioperative hyperglycemia (>180mg/dL) from preoperative period to three days after surgery. Secondary endpoints included length of hospital stay, in-hospital mortality rate, 30-day mortality rate, and incidence of adverse events like surgical wound infection, myocardial infarction, cerebral infarction, and renal failure requiring hemodialysis.
**Results and discussion:** Immediate postoperative blood glucose level was significantly lower in group P compared to group S (197.3 vs 212.4 mg/dL, 95% CI of difference -27.98 to -2.20, $P$= 0.022), but the incidence of hyperglycemia were not different between two groups during surgery and postoperative 3 days. The length of hospital stay, in-hospital mortality, 30-day mortality and each adverse outcome were not different between two groups.

| | Group P (n=85) | Group S (n=83) | P |
|---|---|---|---|
| Intraoperative (n) | 16 (20.5) | 18 (29.0) | 0.321 |
| Immediate postoperative (n) | 57 (67.1) | 59 (72.8) | 0.499 |
| POD#1 (n) | 71 (83.5) | 70 (84.3) | 1.000 |
| POD#2 (n) | 65 (76.5) | 65 (79.3) | 0.712 |
| POD#3 (n) | 58 (69.0) | 64 (79.0) | 0.159 |

*[Incidence of perioperative hyperglycemia]*

| | Group P (n=85) | Group S (n=83) | P |
|---|---|---|---|
| Surgical site infection | 0 (0) | 2 (2.4) | 0.243 |
| Renal insufficiency requiring hemodialysis | 1 (1.2) | 2 (2.4) | 0.618 |
| Myocardial infarction | 0 (0) | 1 (1.2) | 0.494 |
| Cerebral infarction | 0 (0) | 2 (2.4) | 0.243 |
| Length of hospital stay (days) | 14.2 ± 14.7 | 13.9 ± 25.9 | 0.145 |
| In hospital mortality | 1 (1.2) | 3 (3.6) | 0.365 |
| 30 day mortality | 0 (0) | 2 (2.4) | 0.243 |

*[Postoperative outcome, n(%) or mean±SD]*

**Conclusion(s):** Propofol and sevoflurane has comparable effects on the development of perioperative hyperglycemia and postoperative outcome in type II diabetic patients undergoing lung surgery.

## 01AP18-10

### MOANS and LEMON scores: are they useful in our routine airway assessment?

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**Background and Goal of Study:** There is a growing concern about discussing and planning strategies for airway management. To do so it is primordial to improve our capacity to predict difficulty. Obese population frequently presents challenges to both intubation and ventilation. Multiple scores and assessment tools have been described in the literature[1-3].
The aim of this study was to assess whether MOANS and LEMON scores can predict respectively difficult mask ventilation and intubation in obese patients.
**Materials and methods:** After Hospital Ethics Committee approval, a prospective observational study including all obese patients submitted to non-urgent bariatric procedures between June and November 2015 was performed in our institution. Data collected included patients demographics, difficulty of mask ventilation, Cormack and Lehane's laryngoscopy grade, as well as MOANS and LEMON scores. Statistical analysis used Fisher's exact test, with $p<0.05$ considered significant.
**Results and discussion:** A total of 50 patients were included, 90% (n=45) female, with mean age 46 years old (range 21-81). Mean body mass index was 45 (range 34-57). Mask ventilation was described only in 38 patients, being difficult in 22% (n=11). Laryngoscopy was grade ≥2 in 38% (n=19) of cases. Mean MOANS score was 2±0,7, with 80% ≥2. Mean LEMON score was 2 ±1,5. LEMON score ≥5 correlated with more difficult intubation (grade ≥2) (p=0,0494). A statistical correlation was not found between MOANS score and mask ventilation (p=1). Difficult ventilation was not related with the occurrence of difficult intubation (p=1). The study presents some limitations, namely the small sample and lack of some registries.
**Conclusion(s):** LEMON score was able to predict poor laryngoscopic view, and will be included in our routine evaluation. MOANS did not prove useful in predicting difficult mask ventilation in our sample. Larger samples are needed to test MOANS score utility.
**References:**
1. Reed MJ, et al. Can an airway assessment score predict difficulty at intubation in the emergency department? Emerg Med J 2005;22:99-102.
2. Walls R, Murphy M. Manual of Emergency Airway Management. Philadelphia: Wolters Kluwer/Lippincott Williams & Wilkins Health, 2012.
3. Langeron O, et al. Prediction of Difficult Mask Ventilation. Anesthesiology 2000;92:1229-1236.

## 01AP18-11

### Continuous intravenous glucose monitoring in patients with diabetes undergoing major surgery; a randomized controlled trial

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**Background and Goals of Study:** Perioperative hyperglycaemia in patients with diabetes mellitus (DM) is associated with complications after surgery. Continuous Glucose Monitoring (CGM) may improve perioperative diabetes treatment in the operating theatres. Therefore our goal was to investigate the efficacy of perioperative continuous intravenous glucose monitoring via peripheral venous sampling.
**Material and methods:** We performed a randomized controlled trial in adult patients with DM type 2 undergoing major abdominal or cardiothoracic surgery. Patients were randomized to the Standard Care group (SC) or the CGM group. For all patients, prior to induction, the GlucoClear (Edwards; Breda, the Netherlands) was inserted into a peripheral vein, providing glucose readings every 5 minutes.
All patients were treated with insulin, targeting for blood glucose between 4-10 mmol/l. In the SC group, the sensor readings were blinded and alarms were disabled and glucose was measured every 1-2 hours. In the CGM group, sensor readings and alarms were available to guide treatment.
Main outcome measure was median blood glucose 1 hour after end of surgery calculated with an ANCOVA model. Secondary outcome measures included proportion of time in target range and sensor accuracy. Sample size was 36 patients, which was calculated to detect a between group difference of 1 mmol/l with a power of 0.8.
**Results and discussion:** We randomized 36 patients. There was no significant difference in postoperative median glucose In addition, there was no significant difference for times spent in target range (Table 1). The sensor accuracy as measured by the Mean Absolute Relative Difference was 11.2%(SD 12.5).
**Conclusion:** Intravenous CGM did not improve glucose control in patients with DM2 undergoing major surgery. Although technical issues may be partly responsible, providing the anaesthetist with continuous glucose readings does not improve glucose control.

| Baseline characteristics | | | |
|---|---|---|---|
| | **SC (n=18)** | **CGM (n=18)** | |
| Male, n (%) | 11 (61%) | 15 (83%) | |
| Age, mean (SD) | 66.4 (11.4) years | 64.4 (10.2) years | |
| Fasting blood glucose, median (IQR) | 8.2 mmol/l(7.4-9.4) | 7.6 mmol/l(6.3-8.6) | |
| **Outcome measures (median, IQR)** | | | **P-value** |
| Glucose 1 hour after surgery | 9.2 mmol/l(7.9-10.2) | 8.9 mmol/l(6.9-10.3) | 0.73 |
| Time in target range, ABG | 100% (37-100) | 100% (55-100) | 0.68 |
| Time in target range, sensor | 100% (81-100) | 100% (83-100) | 0.86 |

SD = standard deviation; IQR= interquartile range; ABG = arterial blood gas

*[Table 1]*

## 01AP19-2

### Metabolic and hematological disorders of cytoreductive surgery with hyperthermic intraperitoneal chemotherapy (HIPEC)

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**Background and Goal of Study:** Cytoreductive surgery (CS) with Hyperthermic Intraperitoneal Chemotherapy (HIPEC) produces important metabolic and hematological disorders during the entire perioperative period.
We present the evolution of metabolic and hematological parameters of patients who underwent CS with HIPEC.
**Materials and methods:** A prospective descriptive study was conducted of consecutive patients with Peritoneal Carcinomatosis (CP) who underwent CS with HIPEC between March 2014 and February 2015. We applied an anaesthesia protocol and goal-directed hemodynamic and metabolic therapy.
**Results and discussion:** 24 patients were included (mean age 58 ± 13.3 years, 58% ovarian cancer, 33% colorectal cancer).
The pH decreased from 7.42 [7.32 - 7.57] to 7.28 [7.26 - 7.30] during HIPEC. Lactate values increased during the HIPEC up to 3.38 mmol $\cdot L^{-1}$ [2.81 - 4.0], which normalized on the 1st postoperative day without any treatment.
Hyperglycaemia, 396 mg/dl [379-426], occurred during HIPEC in the first 12 patients when using glucose 5% as solvent of cytostatic. The hyperglycaemia dissapeared after using glucose 1,25% as solvent.
75% of patients had hypophosphatemia, 92% hypomagnesemia and 46% hypocalcemia.
All patients showed hypoalbuminemia. 29% of patients were transfused during surgery, with an average of 2 red blood cells pack per patient.
There were no differences of hemoglobin levels at the beginning of the CS between transfused or not transfused patients 9.4 (8.1-10.7) vs 10.7 (9.7 - 11.3) (p = 0.114).

Lower Platelet and higher INR means values were recorded the second post-operative day, being $159 \cdot 10^9$ $l^{-1}$ [73-341] and 1.41 [1.21 - 1.94], respectively, regaining normal values without treatment.

**Conclusions:** In line with other studies[1], metabolic non-hipercloremic acidosis is self-limiting and does not require treatement. Balanced fluid therapy should be used to prevent an increase in acidosis. The use of Cytostatic solvent glucose 1,25% avoid the hyperglycaemia and insulin infusion[2]. Hypomagnesemia, hypocalcemia and hypoalbuminemia usually requires systematic replacement. Preoperative treatment of the anemia could be considered. Coagulation abnormalities had normalized after the third day in most patients. without treatment.

**References:**
1. Pascual J. Arch Gynecol Obstet. 2014
2. Raytis J.L. OJANES 2014

## 01AP19-3

### A case report of massive intracranial haemorrhage associated with endoscopic sinus surgery in a post-anesthesia care unit

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**Background:** We report a case of post-operative massive intracranial haemorrhage as a complication of endoscopic sinus surgery (EES). We decided to report this case in order to illustrate the importance of early recognition of clinical signs of this rare complication and how a stepwise approach to management can result in a favourable neurological outcome.
**Case report:** A 69-yr-old woman with a history of chronic nasal polyps presented for EES. Preanesthetic evaluation was normal. The surgery was performed under general anaesthesia without any complication. After surgery the patient was extubated in the operating room without incident. An hour later, in a post-anesthesia care unit (PACU) the patient had symptoms suggestive of ischemic neurological disease. Physical examination revealed epistaxis, bladder sphincter relaxation.A brain CT-scan was performed showed massive intracranial haemorrhage
A ventricular drainage catheter was placed in the lateral ventricle. Sedative medication was withdrawn. Neurological evaluation was satisfactory. Because of these findings the patient was extubated. Two days later the patient was transferred from intensive care unit to general ward without any neurological deficit.
**Discussion:** The EES makes up a large part of routine operations of an otolaryngologist, only in the United Kingdom hospital12,000 procedures for nasal polyposis alone were undertaken in National Health Service hospitals(1). This surgery takes about 1 hour in our center, later the patient is transferred to the PACU where it recovers about 2 hours. This type of surgery usually does not present any kind of complication however Mosher described intranasal ethmoidectomy as “the easiest way to kill a patient”(2)
The presence of this neurological complication was unexpected in fact we requested a neurology consultation service in the first instance because we believe that the neurological complication had an ischemic basis.We decided to report this case in order to illustrate the importance of early recognition of clinical signs of this complication in this surgery and how a stepwise approach to management can result in a good neurological outcome.
**References:**
1. HES.Informing Health Care.Available at: www.hesonline.nhs.uk.Accessed December 13, 2005
2. Mosher HP.The surgical anatomy of the ethmoidal labyrinth.Ann Otol Rhinol Laryngol 1929;23:881-901
**Learning points:** In the PACU early recognition of clinical signs of this complication in this surgery is vital.

## 01AP19-4

### Totally laparoscopic pancreaticoduodenectomy: early experience of the first 23 cases. Perioperative management and complications

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**Background and Goal of Study:** Totally laparoscopic pancreaticoduodenectomy (TLPD) is an advanced new surgical minimal invasive technique on debate. There is a lack of information about perioperative (POP) management concerning anaesthesia for TLPD. The main of this study is to describe our experience in anesthesia and perioperative outcomes in this topic.
**Materials and methods:** A retrospective analysis of all patients who have undergone TLDP between 2011 and 2015 in our hospital. Patient demographics, comorbidities, pathology, POP complications, length of stay (LOS) and mortality.
**Results and discussion:** Twenty-three cases were operated on via TLPD. Pylorus preserving technique was performed in 78%. Age was 66±12. Previous comorbidity was hypertension 82% and Diabetes 34%.Thirteen patients required previous biliary stenting by ERCP and 60% had acute cholangitis previous to surgery. Mean bilirubin was 4.2±4.4 mg/dl. Tumors were ductal adenocarcinoma (43%), ampulloma (22%) and cholangiocarcinoma (13%). TNM score was T1 (4%), T2 (13%), T3 (52%), T4 (13%) and benign (17%).N1 was 52% and N0 48%. Operative time was 7±1h. Conversion to open surgery was required in 17% of patients. Patients receiving POP transfusion were 17%. Anaesthetic technique was balanced general (opioid plus inhaled) in 95%, TIVA (Propofol+Remifentanil) in 25%. Intraoperative (IOP) combined anesthesia in 52% (Epidural 8, Intradural 4). Monitoring with CVC 100%, standard intra-arterial pressure 21% and Vigileo® 47%.IOP vasopressors was needed in 65% cases. All patients were extubated at OR.
Postoperative ICU-LOS was 4±4 days, EVA pain was <3 in 78% patients. Epidural analgesia was discarded in 25% patients due to hypotension. Postoperative complications were pancreatic fistula (PF) in 43% patients (Grades were A in 6, B in 3 and C in 1 patients), bleeding in 8%, delayed gastric emptying in 4%, biliary fistula in 4% and transfusion in 26% patients. The CLAVIEN classification was I in 28%, II in 57%, III in 28%, and IV in 28% patients. Two patients were re-operated (8%). Hospital LOS was 19±13 days. Hospital readmission was 8%, 30-day mortality was 0% and mortality at one year was 4%.
**Conclusions:** TLPD is a long lasting surgery with high comorbility ,moderate transfusion and low conversion index when it is carried out by expert surgeons. Pancreatic fistula is the most prevalent complication.
**References:**
Sharpe, et al.Com. J Am Coll Surg. 2015.221-175
Boggi, et al.Surg Endosc .2015.29:9-23

## 01AP19-5

### Hemipelvectomy: survival rate, anaesthesia and perioperative management in a serie of 35 cases

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**Background and Goal of Study:** Hemipelvectomy (external or internal) is a major orthopedic surgical procedure. Primary bone and soft tissue pelvic sarcoma are main indications. Anesthesia and perioperative care may be considered as challenging because of the extensive tissue trauma, significant blood and fluid loss, bleeding disorders and intense postoperative pain. The goal of study was determine the survival rate and demonstrate the anaesthetic and perioperative management.
**Material and methods:** After ethical approval, we conducted a retrospective study of 35 consecutive cases collecting data from medical records and from the Department of Pathology database of all patients submitted to hemipelvectomy in the National Cancer Institute, Brazil, in the period between 2000 and 2013.

**Results and discussion:** Survival mean time after surgery was 22.1 months. In bivariated analysis, only advanced disease stage was significant as an independent factor for death (p=0,001, HR= 6,0, 95% CI for HR = 2,03 - 17,6). In multivariated analysis at 5% level, only advanced disease stage (levels 3 or 4) was an independent risk factor to reduce survival rate. External hemipelvectomy was performed in 23 (65.7%) patients. Preoperative data: age 44 years (median); weight 69.1 Kg (median); male 68.5%. General anaesthesia plus regional (epidural with opioids mainly) was done in 32 (91.4%) patients. In perioperative period, 23 (65.7%) patients presented hemodynamic instability. All received fluid resuscitation. Vasopressors were required in 12 (34.2%) patients. Six (17.1%) presented bleeding disorders. Median cristalloid infusion was 3500 ml and colloid administration was 500-1500 ml. Twenty (57.1%) patients received red blood cell concentrate and 4 (11.4%) required other blood products in the operating room (OR). Third tree (94.2%) patients had the trachea extubated in the OR. Severe acute pain was present in 31,4% of the cases and even a larger percentage developed chronic pain (40%). Seventeen (48.5%) patients were transfused postoperatively. One (2.8%) patient developed acute renal failure, 2 (5.7%) presented neurological disorders, 1 presented arrhythmias and 9 (25.7%) developed surgical wound complications. Median hospital stay after surgery was 6 days.
**Conclusion:** Despite advances in anaesthesia and surgical management the survival rate after hemipelvectomy remain low and hemodynamic instability, transfusion rate, acute and chronic pain and poor outcomes remain high.

## 01AP19-6

### Post-thyroidectomy vocal cords paralysis despiste normal intraoperative neuromonitoring of the laryngeal nerves during surgery

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**Background:** Recurrent laryngeal nerve (RLN) injury is one of the most common complications of thyroid surgery. RLN injury can cause vocal cord paralysis, affecting the patient's voice and the quality of life. Injury of the external branch of the superior laryngeal nerve can cause cricothyroid muscle denervation affecting high vocal tones. Thus, securing the laryngeal nerves in these surgeries is of utmost importance. Thats why nowadays, the use of intraoperative neuromonitoring with the NIM tube during surgery is very extended.
**Case report:** 71 years old female with multinodular goitre diagnosed 8 months ago. Surgeons decided to perform total thyroidectomy because it's big size. The intubation was performed with glidescope, looking at the perfect colocation of the NIM tube. After the nerve stimulation was checked, the tube was fixed. During surgery no injury of the recurrente laryngeal nerves was observed. She was extubated in the operation room successfully, and traslated to the postoperatory ICU.
The day after, she sarted with progressive dysphagia. At first, she was treated with corthicoids and antihistamines, because no hematoma or edema was observed and she was already taking these medications at home, but the clinical condition get worst hours later and she presented dysphonia. At this moment, we called the otolaryngologist, who performed a nasal fibrobroncoscopy and diagnosed a "bilateral paresia of vocal cords with important reduction of the air flow, but conserved".
Presuming the inflamatory origen of the paralysis, due the intraoperative monitoring of the RLN and the clinical timing, we decided to amplify medical treatment and we added adrenaline nebulizations.
The patient remained stable, and the symptoms slowly disapeared (2-3 days). However, a tracheostomy had to be performed 7 days after the thyroidectomy because the improvement was too slow to alow minimal efforts.
**Discussion and learning points:** The vocal cords paralysis is an important postoperative complication and it has to be avoided if possible and quickly diagnosed if it happens. The treatment will depend on symptons and the clinical situation of the patient. We can not forget that even with a correct intraoperative monitoring of the RLN, the vocal cord paralysis may occur.
**Reference:**
Deniwar A, at al. Electrophysiological neural monitoring of the laryngeal nerves in thyroid surgery: review of the current literature. Gland Surg 2015;4(5):368-375

## 01AP19-7

### Pulmonary edema after hysteroscopy: a case report

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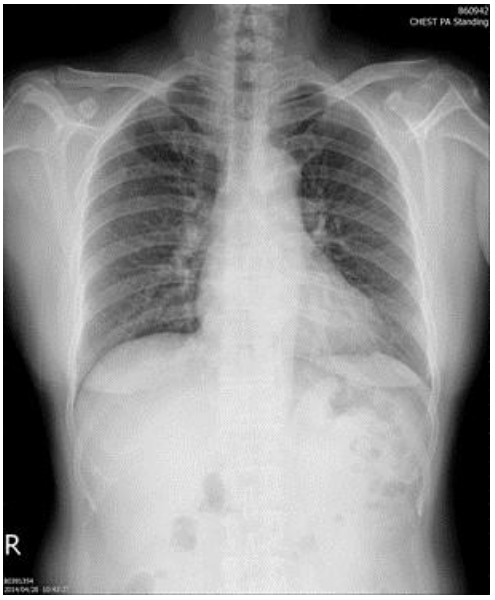
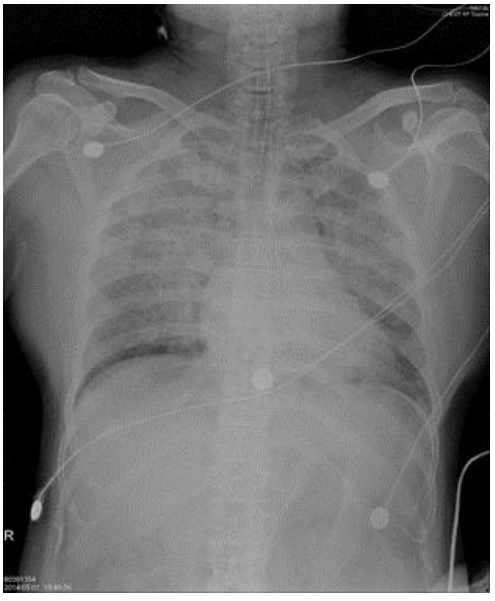
**Background:** The hysteroscopy is established treatment for most intra-uterine pathologies. Awareness of possible complications is essential. The most common complications are perforation of the uterus, fluid overload syndrome, and hemorrhage[1]. We reported a case of acute pulmonary edema during hysteroscopy.
**Case report:** A 54 y/o woman without any systemic disease was scheduled for hysteroscopic resection of a myoma. Preoperative vital sign showed normal blood pressure, heart rate, and $SpO_2$ of 99 %. Intravenous general anesthesia with propofol and alfentanyl was performed. The sub-mucosal wide based myoma was difficult to approach. The normal saline bags with 150cm height above this patient and pressured up to 200mmHg was used to improved surgical visibility. A total of 12 liters of distending fluid had been used in 90 minutes and sudden onset of bradycardia(28/min) and desaturation of $SpO_2$ as 75% were noted. Crackle sounds were heard in bilateral lungs and endotracheal tube was inserted while pinky frothy sputum filled out. The patient was sent to ICU and chest radiography proved pulmonary edema. After treatment, the patient was discharged without any sequela.



*[Preoperative chest film]*



*[B. On arrival of intensive care unit]*

**Discussion:** Althouagh hysteroscopy is an important diagnostic tool, potential life-threatening tragedy may happen. Diagnostic hysteroscopic procedures had low complication rates, while operative hysteroscopic procedures were more risky, due to more aggression to intra-uterine nearby, more exposure of vasculature to distending medium fluid and more operative time.
**References:**
1.Jansen, F.W., et al., Complications of hysteroscopy: a prospective, multicenter study. Obstet Gynecol, 2000. 96(2): p. 266-70.
**Learning points:** To measure volume instilled/volume collected to calculate the fluid deficit. An increase of 15 mm Hg or more in diastolic pressure compared with baseline is an indication of impending pulmonary edema.

## 01AP19-8

### Splenectomy and splenic aneurysmectomy in a patient with giant splenomegaly and portal vein cavernomatosis

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**Background:** Cavernomatosis portal is a rare condition caused by thrombosis of the portal vein. The splenoportal thrombosis is the most common cause of extrahepatic portal hypertension (also called non-cirrhotic portal hypertension) in Spain and its main causes in adults are complications of abdominal operations or infectious, inflammatory or intra-abdominal tumor processes; hypercoagulable states; or liver cirrhosis.
**Case report:** We report the case of a man aged 36 with polycythemia vera treatment with Hydrea and AAS, portal thrombosis, giant splenomegaly, gastric and esophageal varices, gastrointestinal bleeding despite endoscopic treatment, Splenic artery aneurysms, arterial ischemia episode that required amputation of the 5th finger of the left foot and asthma who is proposed for splenectomy and splenic aneurysmectomy.
After basic monitoring intravenous induction was performed without incidents. Given the significant risk of bleeding epidural catheter placement was refused. Right radial artery and central venous access in internal jugular vein were channeled. A introducer system supports rapid infusion of fluids was channeled in right upper limb; neuromuscular relaxation, nasoesophageal temperature and diuresis were monitored. Fluids were administered with fluid heater, thermal blanket was placed and blood recovery was available.
The intervention ran uneventful and the patient was transferred extubated, hemodynamically stable at the ICU for surveillance.
**Discussion:** The main clinical manifestation of non-cirrhotic portal hypertension is, as in the case described, gastrointestinal bleeding esophageal and gastric varices. The management of thrombosis splenoportal is difficult, surgery is not always possible. It should assess the reversibility of the etiology, the risk of surgical treatment, the survival capacity to hemorrhage to determine the therapeutic approach to follow.
**References:**
1. Kyoung-Tae Kim et al. A Case of Cavernoma of Portal Vein associated with Polycythemia Vera. The Korean Journal of hepatology December, 2006 Vol. 12 No.4.
**Learning points:** Given the serious consequences of portal hypertension, particularly untractable gastrointestinal bleeding, each case must be treated individually by a multidisciplinary team . In case opt for surgery, methods for rapid fluid infusion and blood salvage should be available, the blood bank should be alerted and the case should be reported in advance to the anesthesia service and ICU.

## 01AP19-9

### Severe hypercarbia during kneeling-prone retroperitoneoscopic adrenalectomy

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**Background:** Surgical methods are constantly evolving towards improved minimally invasive approaches, with the aims of reduced postoperative morbidity and earlier return to premorbid functional status. The retroperitoneoscopic adrenalectomy in the kneeling-prone position is an example that presents new challenges for the anaesthetist.
**Case report:** We report the case of a 61-year old, ASA II patient with well controlled asthma and a 20 pack year smoking history, who developed severe hypercarbia (PaCO2 >150mmHg) and respiratory acidosis (pH 6.94) during elective posterior retroperitoneoscopic adrenalectomy for an adrenal adenoma. This was performed in a kneeling-prone position. Respiratory parameters improved only after expedited surgical completion and supine repositioning. Possible causes included carbon dioxide ($CO_2$) absorption via subcutaneous emphysema, higher insufflation pressures required for retroperitoneoscopic access, and the kneeling-prone position. Retroperitoneoscopic surgery is associated with increased $CO_2$ absorption compared to laparoscopy, and anaesthetists should monitor $CO_2$ levels with vigilance. In the event of massive hypercarbia, the anaesthetist and surgeon should discuss cessation of insufflation and consider termination of surgery.
**Discussion:** This is the first reported case of massive hypercarbia associated with retroperinoeoscopic adrenalectomy. Potential contributing factors to the generation of severe hypercarbia in this case included increased $CO_2$ absorption during retroperitoneoscopic surgery,[1] absorption of $CO_2$ from subcutaneous emphysema,[2] and potentially reduced respiratory system compliance in the kneeling-prone position. The severity of hypercarbia and acidosis in this case may have lead to life-threatening complications had surgery not been rapidly terminated.
**References:**
1. Streich B, Decailliot F, Perney C, Duvaldestin P. Increased carbon dioxide absorption during retroperitoneal laparoscopy. Br J Anaesth 2003;91:793-6.
2. Wolf JSJ, Monk TG, McDougall EM, McClennan BL, Clayman RV. The extraperitoneal approach and subcutaneous emphysema are associated with greater absorption of carbon dioxide during laparoscopic renal surgery. J Urol 1995;154:959-63.
**Learning points:** Retroperitoneoscopic adrenalectomy has many advantages over other common surgical approaches. One should remain mindful of the potential for severe hypercarbia with this technique, which may require early termination of the procedure.

## 01AP19-10

### Carbon dioxide embolism - a rare complication in laparoscopic surgery

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**Background:** $CO_2$ embolism is a rare but potentially fatal complication during laparoscopic surgery[1]. Due to the exponential growth of this type of surgery, a prompt identification and adequate treatment of $CO_2$ embolism is crucial.
**Case report:** ♀ , 47 years-old, ASA III; BMI 44.2 kg/m² scheduled for laparoscopic vertical gastrectomy. After ASA standard monitorization, general anaesthesia was induced with propofol 2 mg/kg, suxamethonium 1mg/Kg and remifentanil 0.5 mcg/kg/min and maintained with sevoflurane+$O_2$+air.
Soon after insufflation of abdominal cavity with $CO_2$, a sudden onset of hypotension, tachycardia, oxygen desaturation and a rapid decrease in $ETCO_2$, ensued. Immediately, Trendelenburg position was adopted, insufflation of $CO_2$ stopped and anaesthetics discontinued. Manual ventilation with 100% $O_2$ and intravenous crystalloids administered. A multi-orifice central line was placed with escape of gas bubbles that improved blood pressure, $ETCO_2$, and $O_2$ saturation.
A trans-thoracic echocardiogram confirmed the suspicion of $CO_2$ embolism. Surgical team confirmed left hepatic lobe perforation. Cerebral, thoracic, abdominal and pelvic CT scans revealed otherwise irrelevant findings except hepatomegaly. Patient was extubated, admitted to the High Dependency Care Unit for 24 hours. She remained hemodynamically stable, with full recovery of pulmonary function and no neurological alterations. Discharged home 6 days after.

**Discussion:** Severe cases of $CO_2$ embolism described in literature occurred in laparoscopic surgery due to the erroneous placement of the Veress needle into a blood vessel or a parenchymal organ[1]. In this case, the presence of hepatomegaly altered Palmer's point, increasing the risk of embolism. $CO_2$ embolism presents with hypotension, tachy- or bradiarrhythmias, or asystole. A sudden decrease in $ETCO_2$ should alert to this complication, although other causes must be considered[1]. In this case, the diagnosis of $CO_2$ embolism was based on the rapid decrease in $ETCO_2$, hemodynamic instability, visualization of a perforated left hepatic lobe, and the escape of small gas bubbles through the central line.

**Reference:**

Park EY et al. Carbon Dioxide Embolism during Laparoscopic Surgery. Yonsei Med J 53(3):459-466,2012

**Learning points:** A prompt, aggressive treatment is vital once the diagnosis of $CO_2$ embolism is established. Anaesthesiologists and the surgical team should be aware of the signs, symptoms, and strategies to adopt when faced with a $CO_2$ embolism.

## 01AP19-11

### A Review of 113 anaesthetics for cytoreductive surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC)

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**Background and Goal of Study:** Peritoneal carcinomatosis and pseudomyxoma peritonei were previously lethal conditions with dismal survival rates. Cytoreductive surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC) have been described as the treatment of choice for selected patients.

This paper reviews all CRS and HIPECs performed in our center with a focus on perioperative events and anaesthetic implications.

A Review of 113 anaesthetics for cytoreductive surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC).

**Materials and methods:** After approval from the Centralized Institutional Review Board of the Singapore Health Services, all patients who had undergone CRS and HIPEC from January 1997 to December 2012 were included.

**Results and discussion:** One hundred and eleven patients underwent 113 procedures. Patients' mean age was 51.7 (range 14-74) years and 84.1% were females. The mean surgery duration was 9h 10min, standard deviation (SD) 2h 56min. Most tumours were ovarian or colorectal in origin and mean peritoneal cancer index (PCI) score was 14.3, SD 8.9. Mean estimated blood loss was 1481ml, SD 1064. Total intravenous fluids and blood products administered was 8498ml, SD 3941. Postoperatively, most patients, 78.8% required intensive care (ICU) as 75.2% required interval extubation. Patients with lower PCI score were more likely to be extubated immediately postoperation, $p<0.05$. Eighty percent of the patients had coagulopathy postoperatively and they had longer HIPEC duration, $p<0.05$.

Median days of ICU and hospital stay were 2 and 14 respectively. Longer duration of surgery significantly correlated to longer hospitalization. Reasons for prolonged hospitalization were nosocomial pneumonia, pleural effusions, respiratory failure, sepsis and surgical complications such as anastomotic or wound dehiscence, and intraabdominal infections.

Sugarbarker described CRS and HIPEC in 2006 and perioperative outcomes have not been robust in literature. [1] To our knowledge, the current study is the largest series specifically looking at anaesthesia issues such as fluid and acid base management, as well as, respiratory and thermoregulation optimisation.

**Conclusion(s):** CRS and HIPEC is a major surgery with significant morbidity, our study has highlighted some of the perioperative concerns associated.

**Reference:**

1. Sugarbaker PH. New standard of care for appendiceal epithelial neoplasms and pseudomyxoma peritonei syndrome? Lancet Oncol. 2006;7:69-76.

## 01AP20-1

### Birt-Hogg-Dubé syndrome and laparoscopic surgery: is this a cause for concern?

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**Background:** Birt-Hogg-Dubé Syndrome (BHDS) is a rare autosomal dominant disorder characterized by hair follicle hamartomas, renal tumours and spontaneous pneumothoraces. We present a case of a patient with BHDS and his anaesthetic management..

**Case report:** A 65-year-old man presented at our institution with abdominal pain. Computerized tomography (CT-scan) revealed multiple cysts in both lungs and an abdominal lesion in the upper pole of his left kidney for which he required laparoscopic nephrectomy.

Family anamnesis revealed a relative with Birt-Hogg-Dubé Syndrome (BHDS) who had presented with a pneumothorax. No additional organ lesions were detected. Genetic testing confirmed the diagnosis of BHDS in both individuals.

In our patient General anaesthesia was performed cognisant of the risks of laparoscopic surgery in a patient with multiple lungs cysts and the risk of pneumothorax. Low Intermittent pressure ventilation with no PEEP was used following induction with Propofol, Sufentanil and Rocuronium. Intra abdominal pressure was kept to a minimum. Recovery was uneventful and he was transferred to the Intensive Care Unit. Post-operative chest X ray and arterial blood gases confirmed that the Anaesthesia had been uneventful.

**Discussion:** BHDS is extremely rare with a prevalence of 1 in 200,000 but is probably under diagnosed. The Implications of not diagnosing this condition or missing the presence of lung cysts and bullae preoperatively could have serious consequences under anaesthesia. These risks are accentuated by raised intra abdominal pressure with pneumoperitoneum and Trendelenburg position.

The case highlights that anaesthetic management and surgical manipulation can be challenging and life threatening. Its imperative that a joint approach to management is undertaken.

**References:**

1. Birt AR, Hogg GR, Dubé WJ. Hereditary multiple fibrofolliculomas with trichodiscomas and acrochordons. Arch Dermatol. 1977; 113(12):1674-7.
2. Menko, FH et al. Birt-Hogg-Dubé syndrome: diagnosis and management. Lancet Oncol 2009;10,1199-1206
3. Ozer et al. Multiple lung cysts and Birt-Hogg-Dubé Syndrome: Management of anaesthesia and surgery. Gulhane Med J. 2012;54:302-305

**Learning points:** Preoperative assessment of all patients is important. Rare conditions probably occur more frequently undiagnosed than expected. A multi professional approach should always be adopted in patient care.

## 01AP20-2

### Gusher phenomenon prevention in cochlear implant surgery - a case report

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**Background:** The cochlear implant surgery (CIS) is indicated in severe hearing loss secondary to large vestibular aqueduct (LVA). However, it's reported a sudden exit of cerebrospinal fluid (CSF) through the middle ear and external auditory canal in the cochleostomy phase (Gusher phenomenon; GP).

**Case report:** A girl 11 years old, 40 Kgs, with medical history of moderate-severe SNHL secondary to bilateral LVA, was managed with CIS in the right ear at 7 years old. She had a GP during the cochleostomy phase that was treated with furosemide in the perioperative stage. In March 2015 she presented a total hearing loss in the left ear and CIS was indicated.

Anesthetic induction was performed with Thiopental 3mg/kg, Atracurium 0.5mg/kg and Fentanyl 2 $\mu$g/kg. Mechanic ventilation parameters were: VCV FIO2 60%, TV 8mL/kg, RR 12 bpm, without PEEP.

Anesthesia was maintained with Remifentanil 0.15-0.20$\mu$g/kg/min and Propofol 5-6 mg/kg/h. Esmolol was administered in continuous infusion 50 $\mu$g/kg/min to keep MAP around 60mmHg. The volume restriction was guided

with diuresis, invasive blood pressure, cardiac output (CO), systolic volume (SV) and SV variation (SVV) using a FloTrac® sensor and the Vigileo® monitor. Saline solution 0.9% was administered at 2mL/kg/h for SVV between 13-14%. In the last hour of surgery VVS was 18% and the saline solution infusion rate was increased to 6mL/kg/h.
Furosemide was administered at 0.112mg/kg in two boluses (pre and post cochleostomy phase). The surgery duration was 5 hours and no GP was observed.
**Discussion:** There is no evidence for the prevention of GP during the CIS and this situation may hinder the surgery. In some cases the GP management may require a lumbar puncture. In this case we administered prophylactic diuretics doses, guided volume restriction and controlled hypotension. These measures could have a beneficial effect on the volume of CSF and may reduce the incidence of GP during cochleostomy phase in CIS.
**Reference:**
Pradhananga R, et al Cochlear Implantation in Isolated Large Vestibular Aqueduct Syndrome: Report of Three Cases and Literature Review.Int Arch Otorhinolaryngol. 2015 Oct;19(4):359-63.
**Learning points:** The published literature regarding the management of the CIS is limited and lacks of recommendations for the proper treatment of GP. We want to report our experience so new studies can be performed to clarify CIS perioperative management.

## 01AP20-3

### Anaesthetic management in Mc Ardle disease: challenge for the anesthesiologist of a rare condition

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**Background:** Mc Ardle syndrome is a rare condition which affects 1 in 100 000 people (1). It is also known as glycogenosis type V, caused by a missing or nonfunctioning enzyme called myophosphorylase C. Affected patients cannot obtain energy from the aerobic metabolic routes. For that reason, they are more susceptible to experience rhabdomyolisis, renal affection and malignant hyperthermia (1,2,3).
**Case report:** ASA physical status 1, affected by mammal tumor , scheduled to excision, affected with Mc Ardle disease. She was administered 2 mg midazolam prior to the entering to the operating room and 500cc maintainment acetate ringer. Induction with propofol 2 mg/kg, rocuronium 0,6 mg/kg and fentanyl 0,1 mcg. No incidences appeared . A total intravenous approach was followed using propofol and bolus of fentanyl and rocuronium. She was reversed with sugammadex. She discharged from the hospital the same day.
**Discussion:** Mc Ardle disease has a higher risk of malignant hyperthermia, rhabdomyolisis, anaerobic glycolysis and oliguria (1,2,3,4). We consider that the adopted protocol in this case is correct in this kind of pathology. We consider that TIVA minimizes the risk of malignant hyperthermia (2,4). The use of non-depolarizing relaxant is adequate in this kind of muscle affections, so we considered rocuronium which, in addition, has a reversor. In this case is also important preventing shivering via fluid warmer and blanket warmer.. To prevent oliguria, she was administered acetate ringer, having prevented the need of furosemide and antiarhythmic medications(2,4).
**References:**
1.Cadena C. McArdle's disease, postsurgical risks associated with anesthesia- implications in postsurgical recovery. Health Wellness. 2008; 37(1):1-2.
2.Bollig G, Mohr S, Raeder J. McArdle disease and anaesthesia. Acta Anaesthesiol Scand. 2005;49(8):1077-1083.
3.Benca J, Hogan K. Malignant hyperthermia, coexisting disorders, and enzymopathies. Anesth Analg. 2009;109(1):1049-1053.
4.Choleva AJ. Anesthesia considerations in a mcArdle disease. AANA J. 2011 Jun;79(3):243-7.
**Learning points:** Mc Ardle disease is a rare condition that may be a challenge for the anesthesiologist. Anesthetic management should be planned doing an approach to the current literature. The very limited literature is an additional difficulty to the management of these cases. Malignant hypertermia, rhabdomyolisis, oliguria and renal failure should be prevented before the surgery.

## 01AP20-4

### Neuromuscular block and Steinert's disease

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**Background:** Neuromuscular diseases represent a challenge to any anesthetic approach[1]. The use of neuromuscular blocking agents is controversial and according to some authors they should be avoided[2]. When they are necessary, neuromuscular block antagonism is a source of additional complications, namely due to the secondary effects associated with the use of acetylcholinesterase inhibitors in this population.
**Case report:** Man, 37 years, with Steinert's Disease, presenting generalized muscular hypotonia, proposed for Laparoscopic Cholecystectomy.
Surgery was performed under total intravenous anesthesia, using propofol and remifentanil perfusion. One bolus of rocuronium was administrated before orotracheal intubation, after the beginning of neuromuscular block monitoring. One hour after the start of anesthesia sugammadex was given for neuromuscular blockade reversion (TOFc 4/4).
The patient was extubated in the operating room, without residual curarization or any other expected difficulties. Postoperative period followed without any complications, with hospital discharge the first day after surgery.
**Discussion:** Steinert's Disease or Myotonic Dystrophy Type 1 is the most common myotonic syndrome[2]. It's a degenerative hereditary disease, with multisystemic involvement, which manifestations are characterized by muscle weakness and myotonia[1].
The use of neuromuscular blocking agents is one of the main difficulties in its anesthetic approach, due to the risk of necessity of prolonged mechanical ventilation support (as there is an increased sensibility to non-depolarizing agents), succinylcholine-induced cardiac arrest and neostigmine-induced myotonia[2].
Sugammadex seems to be effective for neuromuscular blockade reversion in this population, which can prevent the use and consequent secondary effects of depolarizing muscle relaxants and acetylcholinesterase inhibitors
Our result is in agreement with others already published[2,3], yet more clinical studies are necessary to prove it.
**References:**
1. Muscle Nerve, 2013; 48: 451-460
2. Case reports in Anesthesiology, 2012; Article ID 107952
3. Rev Esp Anestesiol Reanim, 2013; 60(4): 226-229
**Learning points:** The use of neuromuscular blocking agents in patients with neuromuscular disease remains controversial and is one of the main concerns for the anaesthesiologist.
When its administration is necessary, reversion with sugammadex seems to represent a safe and effective approach.

## 01AP20-5

### A successful anesthetic approach in a patient with Schwartz-Jampel syndrome

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**Background:** Schwartz-Jampel syndrome (SJS) is a rare autosomal recessive disease characterized by myopathy, bone dysplasia, and/or growth delays. Individuals are at risk for malignant hyperthermia (MH) and complications such as difficult endotracheal intubation and respiratory failure. We report a successful anesthetic approach in a patient with SJS proposed to dental extraction and alveoloplasty.
**Case report:** A 14 years old male, ASA III, with SJS and controlled epilepsy, was scheduled for dental extraction and alveoloplasty under general anesthesia. Usual medication was carbamazepine 200 mg 2id. He had no history of anesthesias. His mother and brother had the same diagnosis. Preparation: the circuit of the anesthetic machine was changed and dantrolen was available. Before induction, a peripheral venous catheter was placed. No premedication was administered. He was monitored under ASA standards plus core temperature measurement. Induction of anesthesia was done with propofol (3mg/kg). When he became apneic with depressed consciousness and had no reflexes or motor response, laryngoscopy was attempted. Endotracheal intubation was difficult as he had a Cormarck-Lehane grade of IIb. After 2 failed attempts with a Macintosh blade nr.3 and a 6.5mm endotracheal tube (ETT), we used a videolaryngoscope. About 60% of the glottis was visualized, but inserting the ETT was impossible, so a wire frame laryngeal mask (LM) was introduced and used throughout the procedure. Maintenance of anes-

thesia was done with a propofol infusion at 15 mg/kg/h and local anaesthetic infiltration. 15 min before the end, paracetamol 425 mg IV was administered. All of the procedure underwent without events. When he regained consciousness, airway reflexes and spontaneous breathing, we removed the LM. He was transferred to the postoperative unit, hemodynamically stable and painless. He was discharged home 24h later without any complications during the hospital stay.

**Discussion:** Patients with SJS are at increased risk for MH and can have a difficult airway due to microstomia and jaw muscle rigidity. Our anesthetic approach proved to be safe in SJS.

**References:**

Ewees BE, El Fawy DM. Anesthesia for herniotomy in Schwartz-Jampel syndrome. Ain-Shams J Anaesthesiol 2015;8:455-7

**Learning points:** The avoidance of trigger agents for MH and adequate monitoring, and a proper difficult airway management plan are the main concerns in SJS.

## 01AP20-6

### The challenge of a rare case of systemic mastocytosis - case report

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**Background:** Systemic mastocytosis (SM) is a rare disease (1-1.3:10000) characterized by mast cells proliferation and accumulation in several tissues, mainly skin and blood marrow[1]. It may be associated with the occurrence of perioperative immediate hypersensitivity reactions[2]. Due to its potential gravity and also to the few published data about its management, we describe the anaesthetic management of a patient with SM.

**Case report:** Male, 39 years old, ASA 3. Diagnosis of SM at the age of 29 (splenomegaly, anaemia, urticaria pigmentosa,osteoporosis). Previous oral surgery with local anaesthesia since SM diagnosis, without complications. Usual medication: acetaminophen, transdermic fentanyl, metylprednisolone, ranitidine and diazepam.

Proposed to an elective total hip replacement in the sequence of an avascular necrosis of the femur. Thirty minutes before surgery, premedicated with diazepam, hidroxizine, montelucaste, prednisolone and ranitidine. In the operation room, monitored according to ASA standards and medicated with intravenous (IV) fentanyl 50ug and midazolam 2mg. Cefazolin was administered according to the protocol. Skin was prepared for anaesthesia and surgery without friction. Regional technique was performed with a sequential approach. Levobupivacaine 15mg was administered intrathecal and an epidural catheter was placed. Ropivacaine 0.2% epidural and acetaminophen 1g IV were administered 80 minutes after outset of surgery to provide comfort.

At post-anaesthetic care unit, transfused with 320 ml of red blood cells without complications. Post-operative analgesia was performed with epidural drug infusion balloon (ropivacaine 0.1% + fentanyl 2ug/ml) and acetaminophen IV until 5$^{th}$ postoperative (PO) day. Stability during all PO period until discharge (9$^{th}$ PO day).

**Discussion:** Due to a great probability of developing anaphylactic reactions secondary to drugs used in anaesthesia, careful management of these patients is crucial. Records of previous anaesthetic and surgical interventions containing reported allergic reactions are essential.

**Learning points:** Preoperative use of steroids and histamine (H1/H2) inhibitors is not well established as mast cells degranulation blockers in these patients. Eviction of main triggering factors such as muscle relaxants, morphine, hypothermia, anxiety and skin friction is primordial to the achievement of a safe anaesthesia.

## 01AP20-7

### Multisystemic Erdheim-Chester disease: case report outlining anaesthetic considerations and management

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**Background:** With only around 500 cases reported in scientific literature, Erdheim-Chester disease (ECD) is an extremely rare form of CD68 positive non-Langerhans cell histiocytosis, characterized by xanthomatous infiltration of tissues in various organs.

From the anaesthetic point of view, these patients should be addressed globally, given the multisystemic involvement of their pathology.[1] The reported case describes a patient diagnosed with ECD (pulmonary, endocrine and vascular disease) referred for thyroidectomy after being diagnosed with a carcinoma.

To our knowledge, the only existing case report describing the anesthetic management of a patient with ECD was published in 2014.[1]

**Case report:** The clinical case concerns a 69-year-old patient referred for a thyroidectomy after a positive biopsy for papillary thyroid carcinoma, with previous diagnosis of ECD. Imaging, analytical, and pathological examinations showed the presence of central *diabetes insipidus (DI)*, as well as the existence of diffuse vascular thickening in several territories including cerebral, thoracic, and abdominal. The anaesthetic management began with evaluation and optimization of the patient in the pre-anaesthetic period, followed by careful monitoring during surgery and throughout the post-operative stay in intensive care. The chosen anaesthetic technique was a balanced general anaesthesia. The multidisciplinary involvement and diligent supervision resulted in a perioperative free of complications.

**Discussion:** Given the pulmonary findings, endocrine and cerebrovascular disease and cardiovascular alterations, pre-anaesthetic evaluation and optimization was essential. The main goal of the anaesthetic management was to achieve the best hemodynamic stability possible and to prevent any critical events.

**References:**

1. Hanriharan U. et al. Erdheim - chester disease: clinical pearls for the anesthesiologist. J Anaesthesiol Clin Pharmacol. 2014 Apr-Jun, 30 (2): 297-298
2. Diamond E. et al. Consensus guidelines for the diagnosis and clinical management of Erdheim-Chester disease. Blood, 24 Jul 2014;vol 124, n4

**Learning points:** ECD is a rare multisystemic disorder with an anaesthetic approach scarcely described in medical literature; these patients present a challenge to the anesthetist and should be addressed globally.

## 01AP20-8

### Klippel-Trenaunay Syndrome: a troublesome condition

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**Background:** Klippel-Trenaunay Syndrome (KTS) is a rare congenital disorder characterized by the triad of port-wine stain, varicose veins and bony/soft tissue hypertrophy involving an extremity. Beside the limbs, other areas may be affected, such as spinal cord and neck/oropharynx, which poses important challenges to the anesthesiologist: airway management, controversial about neuraxial techniques and potential blood loss. Because of its rarity and the important anesthetic management considerations it requires, we report a case at our institution.

**Case report:** A 47-year-old woman, ASA III, with past medical history of KTS, pulmonary thromboembolism, anticoagulated with rivaroxaban, hemythyroidectomy and neoadjuvant radiotherapy, was scheduled for excision of a popliteal sarcoma. On preoperative evaluation, she presented no signs of difficult airway, normal echocardiogram and normal blood analysis, including coagulation profile. She interrupted rivaroxaban 2 days before surgery.

Surgery was conducted under general anesthesia, induced with propofol and maintained with sevoflurane. Endotracheal intubation was performed under direct laryngoscopy without difficulties. Neuraxial technique was not done because we didn't have any preoperative imaging study to exclude neurovascular involvement. Hemodynamic stability and pain control was maintained and no significant blood loss was recorded.

**Discussion:** Few cases of KTS are published. KTS incidence is low (1:27500)[1] and its anesthetic management is still a matter of controversy. Despite previous reports of difficult airway management, a recent study[1]didn't encountered significant airway difficulties, which was also the case of our patient. Even if blood loss is a potential problem, especially because these patients are frequently anticoagulated, our patient didn't registered significant haemorrhage. As recommended, we didn't performed any neuraxial technique because none neuroimaging study was made before surgery. Still, this possibility can be considered in specific conditions, even if it's controversial[2].

**References:**
1. Barbara D, Wilson J. Anesth Analg. 2011; 113: 98-102
2. Holak E, Pagel P.J Anesth. 2010; 24: 134-8

**Learning points:** Key aspects must be kept in mind in the management of these patients: potential difficult airway (even if rare), massive blood loss that should be anticipated and neuraxial techniques that may be considered only if exclusion of vascular malformations was confirmed by neuroimaging.

## 01AP20-9

### Anaesthetic management of electrical burn in a patient with sickle cell disease

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**Background:** Sickle cell disease (SCD) and electrical burn injuries are unique entities. SCD is an inherited condition due to a mutation in the β-globin gene, which encodes a variant of haemoglobin A and the prevalence in Sub-Saharan Africa is approximately 30%. Electrical burns result in morbidity higher than expected based on burned area.
There are no reports in the literature about the anaesthetic management of these conditions happening at the same time.
**Case report:** We present the case of a 19 years old man, native of Equatorial Guinea, with a history splenectomy, admitted due to high-voltage electric burns.
On arrival at the hospital he was haemodynamically stable (BP 119/85, HR 85 bpm, RR 22 bpm), no dyspnoea or airway compromise, SpO2 100%. No inhalation syndrome and a glasgow coma scale of 15. He had 2% burned body surface to deep dermis. No compartmental syndrome. Laboratory analysis showed normocitic anaemia (Hb 8,4 g/dL; MCV 91.3fL). The haematology consultant observed poikilo-drepanocytosis, target cells and schistocytes on blood smear, being diagnosed with SCD, which was unknown up to this moment. He remained in the ICU, required several transfusions to maintain a Hb up to 7.5g/dl and had an acute sickle cell exacerbation with abdominal pain that was controlled with adequate hydration and correction of anaemia. Burns debridement was scheduled in the fourth day of admission. General anaesthesia, with a laryngeal mask and ASA standard monitoring, was induced using midazolam, fentanyl and propofol. Maintenance was performed with sevoflurane and remifentanyl. Inspired oxygen fraction was set to $SatO_2$ >95%, and adequate hydration, fluid heater, and thermal blanket were used in order to avoid triggers of vaso-occlusive crises. We gave morphine chloride and paracetamol for postoperative analgesia. Total bleeding was 300 ml. We awaken the patient in the operating room and transferred him to the ICU uneventfully.
**Discussion:** During surgeries in patients with SCD special care must be taken to avoid triggers of acute attacks, specially: hypoxia, dehydration, pain, and cold.
In this case we emphasise: good hydration to the patient, taking into account the losses before and during surgery; adequate oxygenation; proper management of the airway, preventing discomfort during handling and adequate analgesia during and after surgery.

## 01AP20-10

### Glutaric aciduria type 1: anaesthetic management of an adult patient for elective laparoscopic cholecystectomy

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**Background:** Glutaric aciduria type 1 (GA1) is a rare hereditary metabolic disorder caused by a deficiency of glutaryl-CoA dehydrogenase; it has an estimated overall prevalence of 1 in 100 000 newborns.
**Case report:** The authors describe a clinical case of a 20-year-old male patient, with a dystonic-dyskinetic syndrome secondary to GA1, who was submitted to elective laparoscopic cholecystectomy under general anaesthesia with sevoflurane.
**Discussion:** In these patients it is important to prevent acute encephalopathic crises while undergoing surgery. To the best of our knowledge, there are no definite reports on the superiority of one anaesthetic drug over another.
The main question is whether to use volatile anaesthetic agents or not. Some authors argue against the use of volatile anesthetics because of the possible association between mitochondrial dysfunction and malignant hyperthermia. On the other hand, more recent literature rules out episodes of malignant hyperthermia and other intraoperative events attributable to the general anesthesia with sevoflurane in paediatric patients with mitochondrial disease and there are also concerns about the possibility of occurrence of propofol infusion syndrome and severe metabolic acidosis. We chose to use sevoflurane as maintenance agent and the anaesthetic course was uneventful.

**References:**
1. K. Stefan et al; Diagnosis and management of glutaric aciduria type I - revised recommendations; J Inherit Metab Dis (2011) 34:677-694
2. H.P.Joaquin et al; Anesthetic management in two siblings with glutaric aciduria type 1; Pediatric Anesthesia (2006) 16:188-191
3. W.N. Teng et al; Anesthetic management of comprehensive dental restoration in a child with glutaric aciduria type 1 using volatile sevoflurane; Journal of the Chinese Medical Association 77 (2014) 548-551

**Learning points:** Although the described case was successful, the anaesthetic management of patients with metabolic disorders like GA1 remains challenging and more clinical data is necessary.

## 01AP20-11

### Egzulceration form of adrenal incidentaloma and hemodynamic state of patient

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**Background:** Pheochromocytomas and paragangliomas (PHEO/PGL) are chromaffin cell tumors that embryonically derive from the neural crest and functionally are capable of production, storage, metabolism, and secretion of catecholamines.About 4-10% of PHEOs are found as adrenal incidentaloma, whereas approximately 5% are diagnosed at surgery. (1)
**Case report:** 58 year old patient was admitted to the clinic for abdominal surgery with signs of acute abdomen, intermittent unrensponsiveness , abdominal pain and hypertension. At the addmitance the lab. came : hematocrit 0,52, Hgb 142, abdominal ultrasound detected presence of intraabdominal fluid and meteorism, abdominal computed tomography detected unspecific changes of the right adrenal gland. Surgeon called for immediate exploratory laparatomy. Upon entering the operating room patient collapses, SpO2 96%; HR 130/min; TA 245/120 mmHg. After induction of general endotracheal anesthesia central venous catheter (v.jugularis interna) and catheter for invasive measurement of arterial pressure (a.radialis) were placed. Surgical exploration find exulceration tumor of right adrenal gland-suspicion of pheochromocytoma. Arterial pressure intraoperatively controlled with Urapidil continuous infusion. Before clamping adrenal drainage veins we decreased Sevofluran concentration and discontinued Urapidil infusion all together. Total intraoperative blood loss was 850ml, two units of packed RBCs and two units of FFP were administred. After tumor removed the patient entered a hemodynamic stabile state. Postoperativly patient was awake, aware, hemodynamically and respiratory compensated and placed in ICU at Clinic for anesthesiology and ICU. In consultation with endocrinologist offices endocrinological diagnostics (norepinephrine 705 mcg; epinephrine108mcg; dopamine 387mcg; VMA

12,3mcg u 24h urine). Histopathology confirmed pheochromocytoma.
**Discussion:** Mortality during anesthesia in previosly undiagnosed pheochromocytoma patient that was subjected to non-related surgery or surgical procedure is up 50%. (2)
**References:**
1. De Groot LJ, et all;SourceEndotext [Internet]. South Dartmouth (MA): MDText.com, Inc.; 2000-.2015 Apr 12.
2. Owen R. Anesthetic Consideration in Endocrine Surgery, "Surgical Endocrinology",19 93.Ch7,P71-84
**Learning points:** The anesthetist should think of incidentaloma in patient with hypertensive crisis, especially because providing hemodynamically stable state is very challenging.

## 01AP20-12
### Propofol and green urine discoloration

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**Background:** Urine discoloration resulting from drugs, dyes, infections and ingested substances has been described in the literature. Propofol, an alkylphenol used in sedation and anesthesia, is known to induce pink, white, green and brown urine discoloration.

*[Green urine]*

**Case report:** A 25-year old woman (58 kg, 1,55 m, P1) was submitted to dermolipectomy and correction of incisional hernia. Epidural anesthesia was administered at T12-L1 using levobupivacaine (0.5%) with epinephrine (1:200.000) and sufentanil (20 $\mu$g). Sedation was achieved and maintained with a continuous infusion of propofol (1-2 $\mu$g.mL$^{-1}$ at the effector site). By the end of the procedure, which lasted 3.5 hours, the bladder contained 300 mL green urine. No further investigations were conducted and the discoloration resolved spontaneously within 3 hours.
**Discussion:** Green urine discoloration is usually caused by the ingestion of substances such as amitriptyline, cimetidine, promethazine, indometacin, triamterene, methylene blue and dyes found in chewing gum and mouthwash. Discoloration may also be caused by pathologies, such as urinary *Pseudomonas* infection, obstructive jaundice, urinary tract fistula and Hartnup disease. Propofol is metabolized mainly by the liver, but also to some extent by the kidneys, lungs and bowels. The metabolites—water-soluble glucuronides and sulfate conjugates excreted by the kidneys—are believed to confer a green color to the urine but are biologically inactive and do not affect nor reflect kidney function. Urine alkalinization tends to increase the production of metabolites. Though rare, discoloration is most likely to occur after long infusions, but has been observed after short infusions or even after a single dose. The symptom resolves as early as 2-3 hours after infusion is stopped.
**References:**
1.Blakey SA, Hixson-Wallace JA. Clinical significance of rare and benign side effects: propofol and green urine.Pharmacotherapy, 2000;20:1120-1122
**Learning points:** Recognizing propofol as the cause of this benign clinical manifestation can prevent unnecessary spending on tests and treatments and prevent anxiety on part of patients and health professionals alike.

## 01AP21-1
### Do different anesthesia machines have a different fraction of rebreathing?

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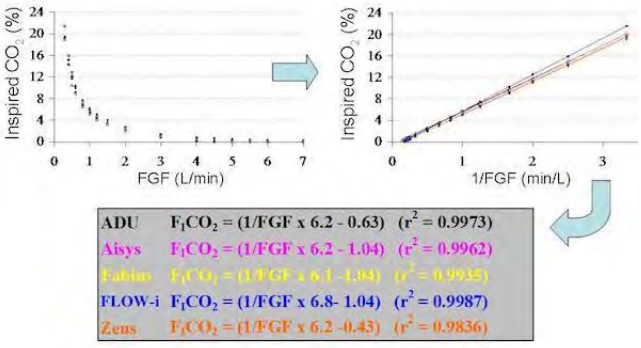
**Background:** The fraction of rebreathing (fR) is the fraction of exhaled gas that is reused in the next inspiration when fresh gas flow (FGF) is below minute ventilation (MV) in a circle system. fR may be machine dependent, because the components of a circle system are organized differently (1). We therefore compared fR of 5 different anesthesia machines in vitro.
**Methods:** We measured the fR of the ADU (GE); Aisys (GE); Flow-I (Maquet); and Fabius and Zeus (both Dräger) by having them ventilate a 2L bag with a MV of 5L/min (10 x 500mL; I:E ratio of 1:2) while 80mL/min $CO_2$ flowed into its tip. Gases, sampled from an HME filter at the Y-piece, were analyzed by the analyzer in the machine (Aisys, FLOW-i, Zeus) or by a M-CAiOV module (GE); sampled gases were redirected into the expiratory limb.
After inserting a $CO_2$ absorber devoid of granules, FGF was reduced from 7 to 0.3L/min (figure 1), a sequence that was repeated 3 times with each machine. The $FiCO_2$ at equilibrium at each FGF was compared among the machines using 2 factor ANOVA (factor 1 = FGF, factor 2 = anesthesia machine). $P<0.05$ denoted statistical significance.
Finally, a Linear Regression was applied to the $FiCO_2$ - (1/FGF) relationship.
**Results:** Groups differed ($p<0.05$) - see Table 1. Even tough $FiCO_2$ did not differ between machines at FGF > 2L/min, some rebreathing was still present when FGF > MV with the Zeus and ADU. A linear fit described the $FiCO_2$ - 1/FGF well (Fig. 1).
**Conclusions:** With FGFs of 0.5 - 2L/min, fR was higher with the Zeus, and lower with the Fabius as compared to the other machines. Differences at FGF <0.5 L/min are likely due to FGF meter or other inaccuracies at these very low FGFs. Whether a higher or lower fR translates into less or more agent usage needs to be clinically confirmed, but the differences are likely small.
**Reference:**
1. Harper M et al. Anesth Analg 1976;55:724-9

| | Anesthesia machine | | | | |
|---|---|---|---|---|---|
| Fresh gas flow (L/min) | ADU | Aisys | Fabius | FLOW-i | Zeus |
| 7 | 0.3 (0.1) | 0.0 (0.2) | 0.0 (0.1) | 0.0 (0.1) | 0.1 (0.3) |
| 6 | 0.3 (0.1) | 0.0 (0.2) | 0.0 (0.2) | 0.0 (0.1) | 0.2 (0.3) |
| 5.5 | 0.4 (0.1) | 0.0 (0.2) | 0.0 (0.1) | 0.0 (0.2) | 0.4 (0.3) |
| 5 | 0.4 (0.1) | 0.0 (0.2) | 0.0 (0.0) | 0.2 (0.0) | 0.5 (0.3) |
| 4.5 | 0.5 (0.0) | 0.0 (0.1) | 0.2 (0.1) | 0.4 (0.1) | 0.6 (0.2) |
| 4 | 0.6 (0.0) | 0.2 (0.2) | 0.3 (0.2) | 0.6 (0.2) | 0.8 (0.4) |
| 3 | 1.2 (0.0) | 0.8 (0.1) | 0.9 (0.1) | 1.3 (0.1) | 1.4 (0.3) |
| 2 | 2.3 (0.0) | 2.1 (0.2) | 2 (0.2) | 2.3 (0.0) | 2.7 (0.6) a |
| 1.5 | 3.5 (0.0) | 3.2 (0.2) | 3.2 (0.4) | 3.5 (0.0) | 4.0 (0.6) a |
| 1.2 | 4.7 (0.2) | 4.3 (0.2) | 4.1 (0.4) b | 4.6 (0.0) | 5.1 (0.8) a |
| 1 | 5.8 (0.2) | 5.4 (0.1) | 5.1 (0.5) b | 5.7 (0.2) | 6.2 (0.8) a |
| 0.8 | 7.5 (0.1) | 6.9 (0.0) | 6.4 (0.2) b | 7.5 (0.1) | 7.6 (0.7) a |
| 0.6 | 9.9 (0.0) | 9.1 (1.2) | 8.9 (0.4) b | 10.3 (0.1) | 10.3 (0.5) a |
| 0.5 | 12.1 (0.1) | 11.7 (0.2) | 10.3 (0.7) b | 12.8 (0.2) | 12.2 (0.6) |
| 0.4 c | 15.0 (0.5) | 14.3 (0.7) | 15.2 (0.2) | 15.9 (0.5) | 15.2 (0.6) |
| 0.3 c | 19.4 (0.4) | 19.2 (0.6) | 18.9 (0.9) | 21.4 (0.8) | d |

*[Table 1. Inspired $CO_2$ (%, mean and standard deviation) with different fresh gas flows and anesthesia machines. See text for details. a and b statistically differ from other machines; c = all differ, except ADU, Fabius and Zeus with 0.4 L/min. d = no data because of external gas reservoir collapse]*




*[Figure 1. Inspired $CO_2$ ($FiCO_2$ in %) with different fresh gas flows (FGFs) and anesthesia machines. Left figure (= graphical presentation of Table 1 data) illustrates $FiCO_2$ is inversely proportional with FGF, which can also be expressed as stating that $FiCO_2$ varies proportional with 1/FGF (right figure); the linear regression results of the $FiCO_2$ versus 1/FGF for each machine is presented in the grey area]*

## 01AP21-2

### Panic at the balneotherapy room - a case of gastric rupture after bag mask ventilation

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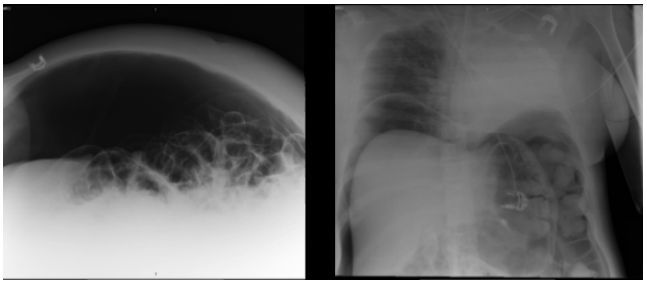
**Background:** Bag mask ventilation is a safe and effective method frequently used. [1] Despite the frequent occurrence of gastric distension, there are few reports of gastric rupture and pneumoperitoneum.[2]
**Case report:** A 50-year-old female patient, ASA 2, was admitted on Burn Unit due to 2nd/3rd grade burns in 34% of body surface caused by fire. On the 22nd day after admission, she underwent balneotherapy under sedoanalgesia in spontaneous ventilation. During the procedure, desaturation (SpO2 65%) and paradoxical respiratory movements were noticed and bag mask ventilation was started with an increase airway resistance perceived. At this time, a remarkable increase in abdominal perimeter was observed, leading to a compromised lower limb circulation. Tracheal intubation was performed and mechanical ventilation started, as a noradrenaline infusion due to marked hypotension. Imagiologic study revealed left pulmonary atelectasis and pneumoperitoneum (Figure 1). An emergent exploratory laparotomy demonstrated a gastric laceration in an ischemic mucosa area. The patient was extubated on the 1st postoperative day with no complications.



*[Figure 1: Pneumoperitoneum on abdominal x-ray]*

**Discussion:** Although bag mask ventilation is a routine practice, it is associated with several complications. Gastric rupture is a rare complication of this technique. The higher incidence of *Curling* ulcers in burned patients can definitely have contributed to gastric rupture and this case stresses the need to consider this potentially lethal complication.
**Learning points:** Gastric rupture is a rare, but potential life-threatening complication of bag mask ventilation. When associated with hemodynamic instability it requires immediate intervention. We should always keep our standards of care even for minor procedures outside the operating room and be aware for complications occurrence.
**References:**
1. Gastric rupture following bag-valve-mask ventilation, The Journal of Emergency Medicine, Vol 22, Issue 1, Jan 2002, Pages 27-29 |
2. Gastric Rupture With Tension Pneumoperitoneum: A Complication of Difficult Endotracheal Intubation, Annals of Emergency Medicine, Vol 30, Issue 3, Sept1997, Pages 343-34

## 01AP21-3

### The time for extubation after stopping infusion of propofol depends on the amount of bolus administration of fentanyl at the end of surgery, but dose not depend on ketamine administered in a surgery with AOPRfK (air-oxygen-propofol-remifentanil-low dose ketamine) anaesthesia

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**Background and Goal of Study:** It is well known that AOPFK anaesthesia has an advantage in postoperative analgesia. However, AOPFK anaesthesia sometimes sets up a delay of awareness from anaesthesia. Nowadays, continuous infusion of remifentanil(Rf), instead of fentanyl(F), is very common. However, in AOPRfK anaesthesia, the same phenomenon sometimes sets up. Therefore, we investigated what the main reason of the phenomenon in spinal surgery.
**Materials and methods:** The study style is retrospective. 11 patients (male/female = 9/2), ASAI-II were included in the study. They were 61±14 (mean ± standard deviation) years old. The induction of anaesthesia was performed with bolus infusion of 1mg midazolam, 2mg/kg propofol (PRO), 50mg rocuronium (Rb), and 0.2μg/kg Rf. In 9 patients, bolus Ketamine (Ket) was administered (0.49±0.11mg/kg) at the induction. In 10 patients, a little amount of sevoflurane was inhaled after intubation, but it was stopped to inhale before a surgery. The maintenance of anaesthesia was performed with 50% oxygen in air, continuous infusion of PRO, Ket (0.48±0.13 mg/kg/h), Rf (0.1-0.3μg/kg/min), and Rb. PRO and Rf infusion rate were adjusted to maintain bispectral index between 40 and 60.
When a surgery ended, continuous infusion of PRO, Ket, Rf, and Rb were stopped and bolus 100-200μg F and 50mg flurbiprofen were administered. 10-20mL ropivacaine or revobupivacaine were given as infiltration anaesthesia when the operative wound was closed. The time between stopping PRO infusion and the extubation (Time)(minutes) was recorded. Regression lines were drawn in the amount of F per body weight administered at the end of surgery (μg/kg) vs. Time(RL1), and Ket infusion rate during surgery (mg/kg/h) vs. Time(RL2), and the total amount of Ket administered per body weight (mg/kg) vs. Time(RL3) by using SigmaPlot 11.0.(Sistat Software Inc., San Jose, CA, USA).
**Results and discussion:** Time was 23±9.7 minutes. The total amount of Ket was 1.52±0.61 mg/kg. The coefficient of correlation value of RL1, RL2, and RL3 is 0.4636, 0.0455, and 0.2878 respectively. According to RL1, it is suggested that F less than 2μg/kg dose not set a prolongation of Time. Ket infusion rate and the total amount of Ket administered per body weight do not contribute to the phenomenon with given dose in the study.
**Conclusion:** The amount of F given at the end of surgery prolongs Time in a dose dependent manner in AOPRfK anaesthesia.

## 01AP21-4

### General anesthesia and laparoscopy: enemies of morbidly obese patients' lungs?

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**Background and Goal of Study:** Morbid obesity (MO) has negative consequences in respiratory physiology. MO is associated with decreased lung and chest wall compliance and respiratory muscle strength, increased airway resistance and work of breathing, impaired ventilation/perfusion ratio and postoperative hypoxemia. General anesthesia (GA) and laparoscopic surgery in obese patients are expected to exacerbate them. Our aim was to assess the impact of these interventions in postoperative blood gas analysis and spirometry values in patients undergoing Roux-en-Y laparoscopic gastric bypass (RYLGB) in our center.
**Materials and methods:** After Health Ethics Committee Approval, a prospective study was conducted in our center. Inclusion criteria: body mass index>35Kg/m2, age 18-65 years, American Society of Anesthesiologists class 1-3. Exclusion criteria: preexisting lung parenchyma disease, chronic obstructive pulmonary disease, moderate to severe asthma, congestive heart failure (above class II in the New York Heart Association classification), hemoglobin concentration lower than 7g/dl or if there were language barriers or severe psychiatric disorder.
Written informed consent was obtained the day before surgery. Patients had the same anesthetic and analgesic protocols. Blood gas analysis and spirometry were done and compared in the preoperative period (T0), 1h(T1), 2h(T2) and 24h(T24) after extubation.
Statistical analysis was performed using IBM SPSS 21. Categorical variables are presented as frequency and percentage and continuous variables are presented as mean±standard deviation (SD). For comparison between groups, the student's t and chi-squared test were used. A p-value<0.05 was considered statistically significant.
**Results and discussion:** 13 consecutive patients were enrolled in the study. In tables 1 and 2 are described demographic and preoperative medical data, and blood gas analysis and spirometry results, respectively. All collected parameters got worse immediately after surgery. T1 PaO2 and T2 FEV1/FVC significantly different from preoperative values ($p<0.05$). However these differences seem to improve afterwards until 24h after surgery, there was no full recovery.

There were no statistically significant differences in blood gas analysis and spirometry values between preoperative period and 24h after surgery.
**Conclusion:** Our results suggest that GA and RYLGB have a negative impact on immediate postoperative respiratory function.

## 01AP21-5

### Evaluation of the maximum force onto the maxillary incisors during endotracheal intubation using simulator. Comparison by anesthetic experience or by types of laryngoscope

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**Background and Goal of Study:** An excessive force onto the maxillary incisors (Fi) during laryngoscopy for endotracheal intubation may cause the several complications. One patient study just demonstrated the significant lower Fi by using the video laryngoscope (VL) compared with by the standard Macintosh laryngoscope (ML) during intubation. However, there is no report how anesthesia experience is affecting the Fi. Therefore, this simulation study was conducted to assess how the anesthetic experience affected the Fi during VL or ML laryngoscopy using the simulator mannequin incorporated with endotracheal intubation evaluation system.
**Materials and methods:** Attending anesthesiologists (Att) and anesthesia residents (Res) in our department participated in the simulation study. Fi was measured by the simulator mannequin: an evaluation type Airway Management Simulator (MW11, Kyoto Kagaku Ltd. JAPAN). Using two types of laryngoscope: VL=MacGRATH ™ MAC (COVIDIEN, JAPAN) and ML, all participants performed endotracheal intubation against simulator three times each. The difference of Fi between Att and Res was compared respectively. The differences in these laryngoscopes also examined. Statistical analysis was performed by Wilcoxon test. P <0.05 was taken to be statistically significant.
**Results and discussion:** Laryngoscopies of 28 doctors (Att: 13 and Res: 15) were evaluated. Fi in Att is less than that in Res either using VL or ML (Table). Furthermore, Fi in Res using VL was greater than that using ML.
**Conclusion(s):** Evaluation type airway management simulator was very easily able to measure the forces to incisor. In Att group, it was found that the safe intubation could be possible with any laryngoscope. To the contrary, our results indicate that residents could reduce the attention to incisor in order to gaze only screen image during VL laryngoscopy. This must be taught to residents at the starting of intubation training.

## 01AP21-6

### Pharmacological interventions to prevent cough at extubation: a meta-analysis

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**Background and Goal of Study:** Coughing causes acute increases in blood pressure, heart rate, intrathoracic, intracranial, intraocular and intraabdominal pressures.[1] These changes can be associated with significant morbidity at tracheal extubation so smooth emergence from anaesthesia is desirable. Little is known of the relative efficacy of the available techniques to prevent cough.
The aim of this meta-analysis was to evaluate six pharmacological techniques to prevent cough at tracheal extubation.
**Materials and methods:** Several electronic databases (1966 to Sep 2015) were systematically searched (AJ, SKR) for original research papers that reported the interventions to reduce cough at emergence from anaesthesia. Data were evaluated using standardized methods.[2] Meta-analyses were performed using fixed or random-effects models based on presence or absence of heterogeneity. Bias was evaluated by observing funnel plots and control event rates (CER). The risk difference (RD; the absolute change in risk attributable to the intervention) was employed as a summary measure of efficacy, and heterogeneity was quantified using the $I^2$ statistic. Number needed to treat (NNT) was calculated from the pooled data to provide a visual estimate of both clinical value and heterogeneity of effect. Pooled subgroup estimates were calculated to provide summary data on effectiveness, but the small numbers of studies in each subgroup limits generalization.
**Results and discussion:** From 1114 articles screened, 22 articles with a median sample size of 50 (interquartile range 40-60) were chosen for the final analysis. The techniques studied included lidocaine (iv & cuff), dexmedetomidine, and remifentanil. Significant bias (CER 0.15-0.96) and heterogeneity ($I^2$>75%) were observed. Several techniques reduce emergence cough with an overall modest effect size (RD -0.38) and low NNT (2.6). The most effective single technique was inflation of the cuff with alkalinised lidocaine (NNT 1.7). The least effective was iv lidocaine (NNT 4.5).
**Conclusions:** No one technique consistently prevents cough; iv lidocaine and tracheal cuff inflation with plain lidocaine are least effective; cuff inflation with alkalinised lidocaine was most effective. However, subgroup analyses are limited by study biases, inadequate sample size and study heterogeneity.
**References:**
1. Leech P et al. *British Journal of Anaesthesia* 1974;**46**:315-6
2. Liberati A et al. *British Medical Journal* 2009;**339**:b2700

## 01AP21-7

### Preextubation fentanyl on hemodynamics & recovery profile, a prospective randomized controlled study

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**Background and Goal of Study:** Tracheal extubation, as well as intubation provoke stressful responses, including tachycardia and hypertension, extubation also provoke airways reflexes causing cough or strain, which are known to increase blood pressure and heart rate. These hemodynamic changes during extubation and emergence from anesthesia may cause dangerous cardiovascular complications. Fentanyl has been used extensively to maintain perioperative hemodynamic stability. This study was carried out to evaluate the effect of fentanyl on cardiovascular responses and recovery profile to tracheal extubation.
**Materials and methods:** We studied 126 patients with controlled hypertension; received chemotherapy undergoing mastectomy operation for breast cancer. The patients divided into 3 groups (n=42) were the first group received 2 mic/kg fentanyl at the end of surgical sutures, the second group received 1 mic/kg, while the third group received 10 ml saline as placebo at the same time. Hemodynamics (mean blood pressure, heart rate), extubation time, Behavioral status (sedation, alertness or agitation) and complication after extubation ( Desaturation, Vomiting, Coughing, Laryngospasm and Shivering) were recorded.
**Results and discussion:** In patients with controlled hypertension, received chemotherapy undergoing mastectomy operation for breast cancer; intravenous fentanyl 1mic/kg given at the end of surgical sutures blunts cardiovascular responses to tracheal extubation and emergence from anesthesia. This does not lead to respiratory depression or prolonged recovery. The use of 2 mic/kg fentanyl at the same time provides more control on the heart rate than 1mic/kg but with delay in the extubation time.
**Conclusion(s):** Preextubation intravenous fentanyl 1mic/kg given at the end of surgical suture is a simple, effective, and practical method in obliterating cardiovascular responses to tracheal extubation and emergence from anesthesia with no respiratory depression or prolonged recovery.

## 01AP21-8

### Impact of time interval between remifentanil and propofol on propofol injection pain

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**Background and Goal of Study:** The current study was designed to determine the most effective time interval between remifentanil and propofol (TimeRP) for the prevention of propofol injection pain in association with remifentanil dosage.

**Materials and methods:** Sixty patients scheduled for elective surgery under general anesthesia were enrolled in the study. Patients were randomly assigned to one of three groups to receive remifentanil at dosages of 0.25, 0.5, or 0.75 μg/kg over 30 s before the injection of propofol. TimeRP was defined as the time interval from the initiation of the remifentanil injection to the initiation of the propofol injection. TimeRP for each subsequent patient was determined by the response of the previous patient using an up-and-down sequential allocation method. Injection pain caused by propofol was evaluated using a four-point scale during the propofol injection. 'TimeRP$_{50}$' was defined as the TimeRP at which propofol injection pain was absent in 50% of patients and it was estimated using isotonic regression for each dose group.
**Results and discussion:** TimeRP$_{50}$ was significantly lower in the remifentanil 0.75 μg/kg group
(38.6 s, 83% CI = 35.6-45.0) than in the 0.5 μg/kg group (65.0 s, 83% CI = 52.5-75.0) or the 0.25 μg/kg group (66.6 s, 83% CI = 57.1-76.5). Thus, the same level of analgesia was achieved faster in
the 0.75 μg/kg group. As a result, increasing the dose of remifentanil may require minimal waiting time for reducing propofol injection pain. Our results also indicate that a comparable reduction of propofol injection pain could be achieved using a lower dose of remifentanil with a longer time interval. This approach requires some extra waiting time; however, the propofol injection pain may be equally well prevented with fewer opioid-related complications.
**Conclusion(s):** The efficacy of remifentanil pretreatment for preventing propofol injection pain can be influenced by the time interval between remifentanil and propofol as well as the remifentanil dose.

## 01AP21-9

### The use of antireflexive endotracheal tubes during laparoscopic operations in gynecology

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**Background and Goal of Study:** Upon awakening from anesthesia endotracheal tube can cause: reflex response (coughing, laryngospasm), adverse subjective sensations, hemodynamic responses (tachycardia and hypertension). Also they make it difficult to synchronize with the ventilator or adequate spontaneous respiration.
The aim of this study was to investigate the effects on intraoperative and early postoperative hemodynamic profile, the frequency of nousea and vomitting, the reflectory reactions and subjective assessment by patients of antireflexive endotracheal tubes in laparoscopic gynecological surgery.
**Materials and methods:** 80 women were studied between 18 and 60 years, ASA I-III, with duration of operation from 30 to 180 minutes. In 40 cases antireflexive endotracheal tubes were applied.
In all cases we used a similar combined general anesthesia with mechanical lung ventilation.
10 minutes before the expected revival in the port of endotrcheal tube lidocaine was injected.
**Results and discussion:** In the study group we got more stable hemodynamics during awakening.
In cases of patient's arterial hypertension we avoided a sharp rise in blood pressure and increase heart rate. The frequency of hyperventilation through antireflexive endotracheal tubes below 2.5 times. The frequency of agitation and anxiety down 8-15 %. The frequency of sore throat, cough, hoarseness lower by 4-10 %. Antireflexive endotracheal tube does not affect the incidence of nausea and vomiting and subjectively are better tolerated by patients.
**Conclusion(s):** Using antireflexive endotracheal tubes makes the period of awakening more comfortable and for the patient and for the anesthesiologist.
**Reference:**
Antireflexive endotracheal tubes can be very useful in cases, when patient has arterial hypertension.

## 01AP21-10

### The comparision of two different types of laryngoscopes for intubation difficulty in thyroid patients

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**Background:** We assessed possible risk factors related to difficult intubation in patients undergoing thyroid surgery by using two different types of laryngoscopes and discussed whether conventional Macintosh laryngoscope or an optic laryngoscope Truview facilitated intubation process.
**Materials and methods:** We prospectively collected data of 200 patients scheduled for thyroid surgery. Clinical risk factors were defined as: Mallampati score, interincisor gap, thyromental distance, sternomental distance, range of neck motion, body mass index, neck circumference, goiter, presence of radiological findings suggesting compression and thyroid weight. All intubations were performed with either a Macintosh or a Truview EVO2 laryngoscope and assessed for Cormack and Lehane (CL) classification and modified intubation difficulty scale (MIDS).
**Results:** The median (25$^{th}$-75$^{th}$ percentile) MIDS score was 3 (2-5). The median Cormack and Lehane score obtained using the Macintosh laryngoscope was significantly higher than that with the Truview EVO2 laryngoscope ($p<0.01$; 2 vs. 1, respectively). Proportion of patients with a thyroid weight≥40 g, a Macintosh CL score =3-4 or a Truview CL score = 3-4, the median Macintosh and Truview CL scores, and mean neck circumference were significantly higher in the group with a MIDS score>5 ($p=0.018$, $p<0.001$, $p<0.001$ $p<0.001$, $p<0.007$ respectively).
**Conclusion:** Presence of a palpable goiter, thyromental distance<6.5 cm, and thyroid weight≥40 g were risk factors associated with difficult intubation in the multivariate regression model, and although better CL grades were obtained using the Truview EVO2 laryngoscope it was observed that, there was no difference in percentage of Truview and Macintosh laryngoscope usage in patients with a MIDS score>5.

## 01AP21-11

### Anesthesia of a patient with tracheomegaly found accidentally

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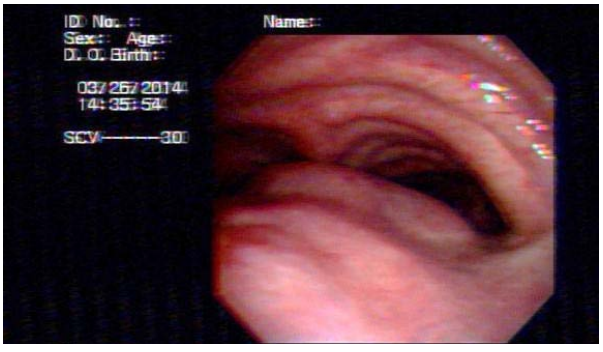
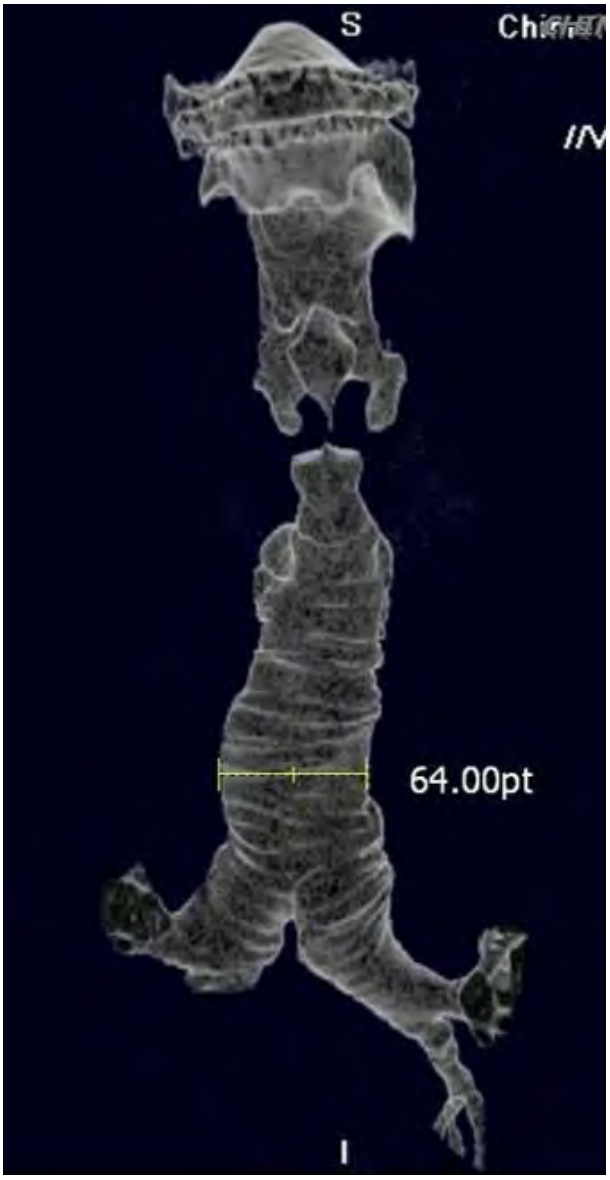
**Background:** Tracheomegaly is known as Mounier-Kuhn syndrome with dilatation of the trachea and bronchi due to a defect of the elastic/muscle fiber. The diagnosis follows image investigation and is associated with chronic respiratory infection(CRI). Most symptoms appear during childhood. We present a case of adult onset tracheomegaly, probably secondary to chronic obstructive lung disease.
**Case report:** This is a 75 year old male heavy smoker with CRI and admitted for a debridement surgery due to sacral pressure sore. He received general anesthesia due to refusing regional anesthesia. A 7.5 mm internal diameter(ID) endotracheal tub(ETT) was used, but circle and peritubal leakage were evident even a larger ETT of 8.5 ID was exchanged. Fiberoptic bronchoscopy revealed tracheobronchomalacia/tracheobronchomegaly with dynamic collapse. Surgery was postponed. Chest CT scan was arranged and tracheomegaly was confirmed. Then the surgery was performed under regional anesthesia successfully.




*[tracheal dilatation, tracheomalacia with dynamic c]*




*[Tracheal reconstructional computed tomography, max]*

**Discussion:** The clinical features of tracheomegaly were symptoms of CRI. It can be diagnosed by a tracheal diameter > 30 mm in an image study[1]. The increased compliance of the airway results in easy collapsibility. If tracheomegaly is suspected, the following measures may minimize the anesthetic complications: use of an ETT and charging the throat with wet gauze to reduce the gas leakage and danger of aspiration; careful use of suction catheters to minimize trauma; awareness of the possibility of barotraumas under positive pressure ventilation; use of regional anesthesia.

**Reference:**

1. Krustins E, et al. Mounier-Kuhn syndrome or congenital tracheobronchomegaly: a literature review. Respir Med 2013;107:1822-8.

**Learning points:** Knowing the predisposition to aspiration pneumonia or peritubal leakage and tracheal trauma during general anesthesia with ETT in tracheomegaly patients.

## 01AP22-1

### The effects of premedication with diazepam on intravenous dexmedetomidine under spinal anesthesia

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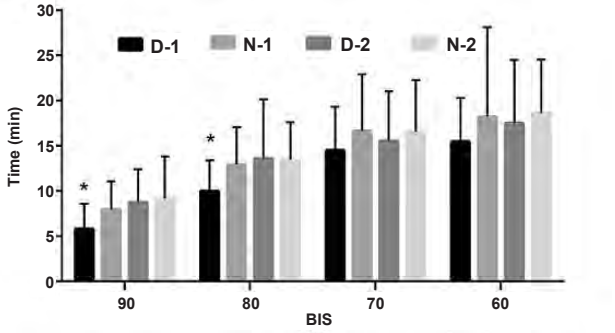
**Background and Goal of Study:** Diazepam and dexmedetomidine, both sedatives have the same effect on the central nervous system for anxiolysis and sedation.
In this study, we evaluated the effects of oral diazepam used for premedication on intravenous dexmedetomidine for sedation during the surgery under spinal anesthesia.
**Materials and methods:** This study enrolled 60 adult patients who were scheduled for orthopedic surgery. Patients were randomized to receive premedication with oral diazepam or not(Group D: n=30, Group N: n=30). After performing the spinal anesthesia, patients were further allocated randomly and equally into group D-1, N-1 (dexmedetomidine loading 1.0mcg/kg for 10 min, 0.5mcg/kg/hr maintenance) and D-2, N-2(dexmedetomidine loading 0.7mcg/kg for 10 min, 0.4mcg/kg/hr maintenance).
Heart rate, blood pressure, oxygen saturation, BIS, Ramsey sedation scale, pin-prick level test and Bromage scale were recorded during the operation and recovery period.
**Results and discussion:** The time taken to reach to BIS score 90 and 80 were significantly faster in the D-1 group (5.8 ± 0.71, P = 0.033, 10.0 ± 0.88, P = 0.037) compared to the other groups (Fig. 1).




*[Fig.1 The comparison of the time taken to reach to each BIS. BIS: bispectral index, D-1: oral diazepam 7 mg and dexmedetomidine 1 ug/Kg loading + 0.5 maintenance infusion, N-1: dexmedetomidine 1ug/Kg loading + 0.5 maintenance infusion, D-2: 7 mg oral diazepam and dexmedetomidine 0.7 ug/Kg loading + 0.4 maintenance infusion, N-2: dexmedetomidine 0.7 ug/Kg loading + 0.4 maintenance infusion. * p<0.05]*

There were no significant differences in sedation score, spinal block level regression time, and the incidence of adverse side effect among the groups (Table 2,3).

| | D-1 (n = 15) | N-1 (n = 15) | D-2 (n = 15) | N-2 (n = 15) |
|---|---|---|---|---|
| Number of Ramsay sedation score on PACU (5/4/3/2)(n) | 0/9/5/1 | 0/4/9/2 | 0/8/6/1 | 0/5/7/3 |
| Time for regression of Ramsay sedation score (<3)(min) | 45.3 ± 25.03 | 32.9 ± 18.16 | 44.0 ± 18.44 | 30.0 ± 19.27 |
| Maximal sensory block level | T 8 [T6 - T10] | T 8 [T6 - T10] | T 7 [T5 - T10] | T 7 [T5 - T10] |
| Time for regression of motor block (Bromage scale 3 to 1)(min) | 127.3 ± 28.96 | 126.4 ± 25.30 | 118.7 ± 20.40 | 117.0 ± 18.30 |
| Time for two-segment regression of pinprick sensory block (min) | 109.3 ± 24.70 | 97.1 ± 32.68 | 91.3 ± 13.43 | 99.0 ± 19.29 |

Values are presented as mean ± SD and median (range). D-1: oral diazepam 7mg and dexmedetomidine 1 ug/Kg loading + 0.5 maintenance infusion. N-1: dexmedetomidine 1 ug/Kg loading + 0.5 maintenance infusion. D-2: 7mg oral diazepam and dexmedetomidine 0.7 ug/Kg loading + 0.4 maintenance infusion. N-2: dexmedetomidine 0.7 ug/Kg loading + 0.4 maintenance infusion. When compared with D-1 and N-1 P = 0.006, when compared with D-2 and N-2 p = 0.07 in time for regression of Ramsay sedation score.

*[Table 2. Comparison of the score and duration of spinal motor and sensory block between the groups]*

**Conclusion(s):** Premedication with 7mg diazepam speeded up the sedative effect of dexmedetomidine in 1mcg/kg loading and 0.5mcg/kg maintence. But diazepam as premedication did not influence on the duration of conscious sedation with dexmedetomidine. Combined use of diazepam as premedication and dexmedetomidine during the surgery did not make oxygen desaturation during and after surgery.

## 01AP22-2

### Higher rates of early mobilisation and lower peri-operative opiate use occur with subarachnoid block as part of an enhanced recovery protocol for total laparoscopic hysterectomy

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**Background and Goal of Study:** We have developed protocols for enhanced recovery after gynaecological surgery. We have assessed the effect of subarachnoid block (SAB) on the use of opiates and antiemetics for total laparoscopic hysterectomy (TLH) and the effect on patient experience.
**Materials and methods:** 123 cases of patients undergoing TLH were analysed from patient records. Patient satisfaction questionnaires were completed prior to discharge with 71(57%) of questionnaires being returned, though not all providing complete data; 71 completed information with regards to Day 0, whilst 67 provided data with regards to Day 1 post-op, and 61 reported mobilisation data. 2 cases provided incomplete response with regards to nausea or pain.Data were analysed using Microsoft Excel.
**Results and discussion:** 98 patients (81%) received SAB and a general anaesthetic.In the post-operative care unit (PACU),13/25 (52%) patients who had not received SAB required opiate,in comparison,only 7/98 (7%) patients who had SAB required opiates ($p<0.0001$, fisher's exact test). 7/12(58%) of those who did not receive SAB reported moderate-to-severe pain in PACU whilst a significant reduction to 7/59 (12%) with SAB was noted ($p=0.0012$). There was reduced need for rescue antiemesis in PACU, however this was not significantly altered by SAB.In PACU, SAB led to a non-significant reduction in the level of nausea reported - 8/58 (14%) had moderate-to-severe nausea after TLH with SAB, whereas 5/13 (38%) had a similar level of nausea without SAB ($p=0.052$). On return to the ward, Day 0, similar differences were noted for both pain and nausea.At Day 1 post-op, no significant difference in pain was reported. Patients receiving SAB had significantly lower levels of nausea; 4/54 (7%) reporting moderate-to-severe nausea after TLH with SAB whilst 4/13(31%) without had a similar level of nausea ($p=0.04$). Patients receiving SAB were more confident in mobilising on Day 1. 41/48 (85%) responders felt confident mobilising 'most or all of the time' contrasted with 6/13 (46%) without SAB who felt similarly confident ($p=0.0064$).
**Conclusion(s):** Subarachnoid Block (SAB) as part of Enhanced recovery for TLH is associated with lower use of opiate in the perioperative period. There is a significantly increased confidence in mobilisation on Day 1 post-surgery. These findings would suggest that SAB may enhance patient experience and increase the rate of early mobilisation following TLH, aiding early discharge.

## 01AP22-3

### Patient controlled sedation as coadjuvant for local or regional anesthesia

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**Background and Goal of Study:** Patient controlled sedation (PCS) allows patients to administer medication according to their individual needs, and offers a sense of control of the situation. We evaluate the overall satisfaction among patients and anesthesiologists.
**Materials and methods:** Data were collected by convenience, after patients consent was given. Data of 19 patients (n=19) were recorded. CADD- Solis® PCA pumps (Smiths Medical) were used. The program designed was: a 40 mg of Propofol 1% bolus every five minutes as much times as required. We assessed minimum SpO2, minimum BIS, adverse effects, boluses requested and boluses given, grade of sedation achieved, satisfaction of the patient and the anesthesiologist using a visual analogue scale from 1 to 5, being 1 no satisfaction at all and 5 highest satisfaction. ETCO2 was monitored.
**Results and discussion:** SpO2 remained stable, with a minimum SpO2 of 94% in one patient. No apnoeas were detected. The average number of boluses requested was 18, 9 and the average number of boluses given was 4,4. The sedation was reconverted in general anesthesia in 1 case, due to lack of collaboration of the patient. Grade III of sedation (sleepy, responds to commands) was achieved in 42% of the patients, 21% experienced pain at infusion. BIS minimum average obtained was 69,8. Average satisfaction among anesthesiologist was 4,4 and average satisfaction among patients was 4,8 (obtained at time of discharge of our unit).
**Conclusion:** PCS remains as a safe alternative to traditional sedation, with a high satisfaction among patients and anesthesiologists. Randomized controlled trials are needed to confirm these findings.

## 01AP22-4

### Who is using opioid free anaesthesia today and why?

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**Background:** Opioid free anaesthesia (OFA) is a new method to deliver general anesthesia. Who, Why and How is using it?
**Method:** A survey was sent to all anaesthesiologist who visited Bruges since the OFA introduction in 2011 (307 sent, 89 answers), to most Belgian anaesthesiologists (2350 sent, 392 answers) and to some anaesthesiologists worldwide who have heard of it (823 sent, 117 answers).
**Results:** 150 (24 %) anaesthesiologist of them give every time (39) when possible or on indication (111) OFA. 241 (39 %) anaesthesiologists reduce their opioids (LOA) while 177 (28 %) would like to learn how to avoid them. Only 55 (9 %) do not see the value of LOA or OFA.
The anaesthesiologists giving OFA live in 25 different countries. Most of them live in Belgium(93), Mexico(6), Switzerland(5), United Kingdom(4), Brazil(3), United States(3), Russia(3) and South Africa(3).
Anaesthesiologists giving OFA for more than 5 years are most from Belgium where this approach started by M DeKock at the UCL.
If selective, OFA and LOA is given for patients with OSAS (90%), COPD (52%) or morbidly obese patients (78 %).
The additives used to give OFA or LOA are:
Clonidine (68 %) or Dexmedetomidine (26 %), Ketamine (67 %), Lidocaine (61%) and Magnesium (42 %).
Most use a multimodal approach:
Ketamine bolus 0,1 to 2 mg/kg; Lidocaine bolus 1 to 2 mg/kg followed by infusion 1 to 2 mg/kg/h; Clonidine bolus 1 to 3 mg/kg infusion only post operative; dexmedetomidine loading dose 0,4 to 2 mkg/kg/h followed by 0,4 to 1,4 mkg/kg/h.
The reasons to avoid or reduce opioids are primarily ERAS (69 %), prevention of respiratory depression (67 %) or hyperalgesia (49 %).
The most important advantages are less PONV (75 %) and earlier recovery (66 %), less sedation first evening (50 %), less opioids needed for analgesia and positive reactions from patients (32 %), surgeons and nurses (20 %).
The disadvantages are limited to more pain (34 %), hypertension, tachycardia (27%) and more sedated (27%).
Serious side effects possible related to OFA are 6 %.
Anaesthesiologists who regret to change do this because of insufficient guidelines or practical protocols (41 %), training (33 %) or lack of publications on outcome (28 %).
**Conclusion:** The survey shows that OFA is used worldwide mostly for special indications with more positive reactions. It is dificult to learn this approach that requires more training, publications and protocols.

## 01AP22-5

### Randomised controlled comparison of monitored anaesthesia care using dexmedetomidine-remifentanil vs. propofol-remifentanil during hysteroscopy

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**Background:** The purpose of this study was to compare the safety and efficacy of dexmedetomidine-remifentanil and propofol-remifentanil during monitored anaesthesia care (MAC) for hysteroscopy.
**Methods:** Seventy female patients undergoing hysteroscopy were randomly assigned to either the dexmedetomidine (Group D) or the propofol (Group P) group. In both groups, remifentanil was infused using a target-controlled-infusion system with a target concentration of 2 ng/ml. The study drug (0.6

ml/kg; dexmedetomidine 2 μg/ml or propofol 4 mg/ml) was loaded for 10 min followed by 0.1-0.5 ml/kg/h to maintain a bispectral index of 60-80 during the procedure. Respiratory depression was defined as SpO2 <90% or respiratory rate <8 breaths/min. Intra- and postoperative pain were also evaluated using a numeric rating scale (0-100).
**Results:** The intraoperative mean arterial pressure (MBP) was significantly higher in Group D only until the start of the operation. The intra- and postoperative heart rate and postoperative MBP were generally lower in Group D. The incidence of respiratory depression was significantly lower in group D (14 [41.2%] vs. 5 [13.9%], P = 0.01, Groups P and D, respectively). Intraoperative pain (16 ± 27 vs. 7 ± 14, P > 0.05, Groups P and D respectively), postoperative pain (20 ± 25 vs. 12 ± 21, P > 0.05, Groups P and D, respectively) did not differ between the groups.
**Conclusion:** We conclude that the combination of dexmedetomidine-remifentanil can reduce the incidence of respiratory depression and provide safer anaesthesia compared with propofol-remifentanil for MAC during hysteroscopy.

## 01AP22-7

### The effect of remifentanil on propofol requirements for loss of consciousness and response to painful stimuli during TIVA

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**Background and Goal of Study:** Although propofol and remifentanil provide different components (unconsciousness and analgesia, respectively) of total intravenous anaesthesia, there may be some crossover synergy. A comparison was made for propofol requirements at loss of consciousness and loss of response to pain.
**Materials and methods:** Induction of anaesthesia was conducted in two groups, one using propofol target controlled infusion (TCI; Marsh effect) alone and one with the addition of remifentanil TCI (Minto; 3 ng/ml). Loss of consciousness was defined as the point at which the patient stopped responding to tactile and vocal stimulus. Loss of response to pain was defined as the point at which the patient stopped withdrawing from a tetanic stimulation from a peripheral ulnar nerve stimulator. 89 patients were studied, 43 in the propofol alone group and 46 in the propofol plus remifentanil group.
**Results and discussion:** Loss of response to pain required greater propofol concentrations (55.2% difference) without remifentanil but the addition of remifentanil had minimal effect on propofol dose for loss of consciousness (12.9% difference). The mean target effect site concentration of propofol for loss of response to pain in the propofol alone group was 4.5mcg/ml and in the plus remifentanil group was 2.9mcg/ml. The mean target effect site concentration of propofol for loss of consciousness was 2.94mcg/ml for the propofol alone group and 2.57mcg/ml for the plus remifentanil group.
**Conclusion(s):** Hypnosis using propofol TIVA is not markedly affected by remifentanil. Remifentanil does, however, markedly reduce the amounts of propofol required to obtund pain.
**Acknowledgements:** The authors would like to thank the anaesthetic department and the surgical department at the Queen Mary Hospital, Hong Kong for the cooperation during this study.

## 01AP22-8

### A PK/PD based method to estimate the propofol concentration for maintenance of anesthesia

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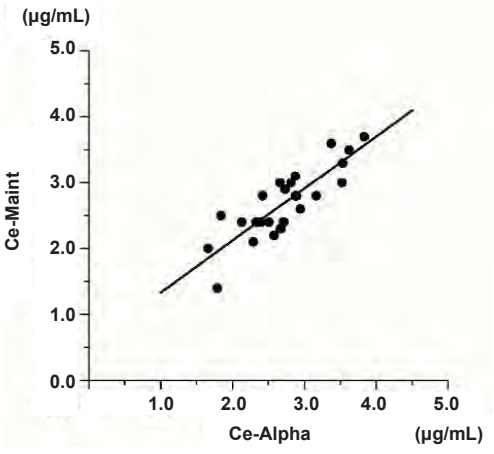
**Background and Goal of Study:** It is important to assess the individual sensitivity to propofol in total intravenous anesthesia, because sensitivity to propofol is widely varied among individuals. We previously reported that effect-site concentration (Ce) of propofol at loss of response (Ce-LOR) would become a good indicator of sensitivity to propofol in each individual. Our previous result suggested that Ce-Alpha, Ce at power of electroencephalogram in alpha range (9-14Hz) became highest, could be used as the target concentration for maintenance of anesthesia. We determined Ce-Alpha before surgery. Here, we compared Ce-Alpha and Ce of propofol at maintenance of anesthesia during surgery to test our hypothesis.
**Materials and methods:** After approval of the ethical committee of our institute and obtained written informed consent from the participants, we enrolled 26 female patients (aged 33-65) who were scheduled mammectomy for breast cancer. Besides the standard monitors, we used BIS monitor (BIS-XP) and all raw EEG packet as well as EEG derived parameters were recorded on a computer using our original software “BSA for BIS”. Propofol was infused using TCI pump (TE-371; TERUMO, TOKYO, JAPAN). Target concentration was adjusted so that Ce of propofol was gradually increased (about 0.3 μg/mL/min) until burst pattern was observed. Ce-LOR and Ce-Alpha were calculated by computer simulation and offline analysis of EEG.
Anesthesia was maintained by propofol and remifentanil. During surgery, anesthesiologists adjusted the target concentration of propofol by referencing raw EEG as well as BIS or other parameters. We defined Ce-Maint as the average Ce of propofol during surgery. Then we compared Ce-LOR, Ce-Alpha and Ce-Maint.
**Results and discussion:** Ce-LOR and Ce-Alpha were closely correlated with Ce-Maint (R = 0.89, 0.85, respectively). The difference between Ce-Alpha and Ce-Maint was 0.03±0.3 μg/mL (Mean±SD). Current results suggested that we could use Ce-Alpha as the target concentration for maintenance of anesthesia during surgery.
**Conclusion(s):** We could estimate the required propofol concentration for maintenance by Ce-LOR or Ce-Alpha during induction.




*[Fig]*

## 01AP22-9

### Pharmacodynamic and pharmacokinetic study on oral propofol, fospropofol disodium and HX0969w in rats

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**Background and Goal of Study:** HX0969w designed by our laboratory was proved to be in good water solubility and rapid onset as an anesthetic. The purpose of this study was to compare the bioavailability and potency of HX0969w with propofol and fospropofol disodium in rats though oral route.
**Materials and methods:** Onset anesthetic time, duration and recovery time were recorded at equivalent doses. Sixty rats were randomly divided into six groups, three groups were treated with oral administration of propofol, fospropofol disodium and HX0906w respectively, other three groups were intravenous administrated with above mentioned drugs respectively. Propofol concentration in blood was detected by methodology of HPLC-fluorescence, while HX0969w and fospropofol disodium were detected by means of LC-MS/MS.
**Results and discussion:** The potency of HX0969w was higher than propofol and fospropofol disodium by oral route. In addition, HX0969w showed fast onset, short duration time, and more conducive to the rats' rapid recovery from unconsciousness.

| | Oral | | | Intravenous | | |
|---|---|---|---|---|---|---|
| Drug | propofol | Fospropofol | HX0906w | propofol | Fospropofol | HX0906w |
| Dose | 227.5 | 260.0 | 193.1 | 9.64 | 87.32 | 92.98 |
| Onset time | 16.0±5.9 | 7.5±2.8 | 10.0±2.9 | 0.4±0.1 | 2.1±0.7 | 1.8±0.4 |
| Duration time | 198.9 ±110.0 | 131.9 ±32.7 | 66.9 ±21.5 | 27.1 ±6.0 | 68.5 ±18.4 | 75.8 ±9.6 |

*[The potency of compounds]*

The pharmacokinetic parameters demonstrated that the speed and degree of metabolism for HX0969w in the body after oral administration were higher than those of propofol and fospropofol.

| parameter | Prodrug | | Propofol | released propofol | |
|---|---|---|---|---|---|
| | fospropol | PropofolW | | PropofolF | PropofolW |
| Cmax (ug/ml) | 603.49 ±411.29 | 321.3 ±67.22 | 23.4 ±4.69 | 21.91 ±4.98 | 24.26 ±5.14 |
| Tmax(min) | 1.00 | 1.00 | 0.5 | 4.5±1.18 | 4.0±0.47 |
| t1/2(min) | 49.29 ±40.31 | 71.79 ±59.52 | 54.24 ±16.18 | 78.97 ±29.05 | 88.62 ±77.35 |
| AUC0~t (minug/ml) | 3804.92 ±2091.75 | 1053.78 ±214.37 | 219.23 ±42.21 | 704.53 ±226.25 | 740.5 ±186.33 |
| MRT(min) | 13.15±5.45 | 3.67±1.71 | 29.45±4.63 | 50.92±4.4 | 52.6±2.90 |
| CL (ml/min/kg) | 31.12 ±19.09 | 89.97 ±15.94 | 43.28 ±8.46 | 68.12 ±22.84 | 54.67 ±13.83 |

*[Pharmacokinetic parameters of compounds]*

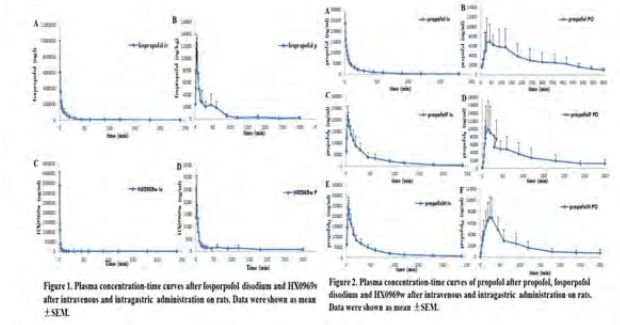

Figure 1. Plasma concentration-time curves after fospropofol disodium and HX0969w after intravenous and intragastric administration on rats. Data were shown as mean ±SEM.

Figure 2. Plasma concentration-time curves of propofol after propofol, fospropofol disodium and HX0969w after intravenous and intragastric administration on rats. Data were shown as mean ±SEM.

*[Plasma concentration-time curves of propofol, fospropofol and HX0969W]*

The absolute bioavailability of propofol, fospropofol disodium and HX0969w were 35.69%±16.85, 50.71%±21.91 and 44.53%±18.63.
**Conclusions:** HX0969w can reduce the intake of propofol and improve the utilization rate of propofol. It may be suitable for small outpatient surgery as a preoperative sedative drug.

## 01AP22-10

### Survey: how much and how to administer propofol in the induction phase of general anesthesia and how to evaluate its effect

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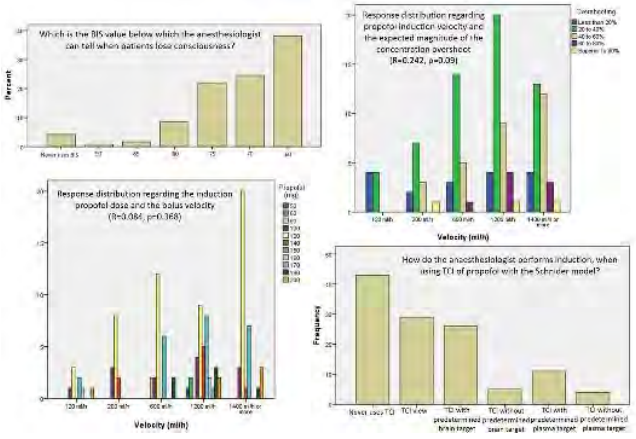
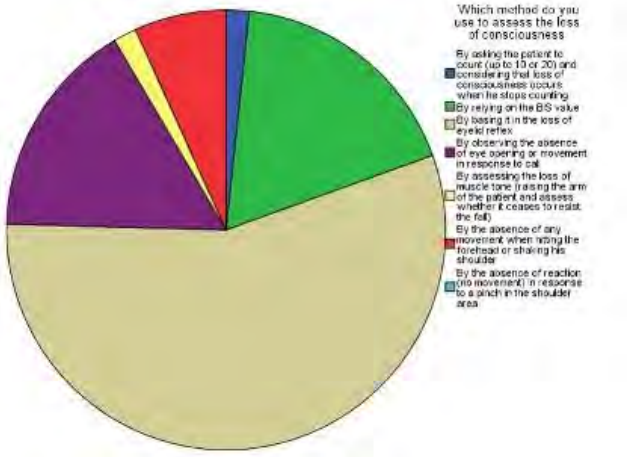
**Background and Goal of Study:** Mostly used drug for the induction and maintenance in total IV anesthesia, propofol, can be delivered as a manual bolus or using different systems, such as TCI, where excessive anesthesia should be avoided. Since this concept is related to the pharmacokinetics and pharmacodynamics knowledge and to the correct interpretation of vital signs monitoring, we conducted a survey to assess the regular practice of Portuguese anesthesiologists with regard to the administration of propofol for induction of general anesthesia.
**Materials and methods:** Anesthesiologists working at 11 large public hospitals in Portugal were sent an email requesting them to answer an on-line survey (IRB approval). The scenario was a male patient (50 years, 60kg, 160cm, ASA I) without premedication, to undergo general anesthesia and tracheal intubation for laparotomy procedure in order to perform a cholecystectomy. 0.15mg of fentanyl were administered three minutes before induction. General anesthesia was induced with 1% propofol by a 20cc syringe. The anesthesiologist was at the bedside pre-oxygenating, monitoring and instructing the nurse administering the drugs through an IV line inserted in the back of the patient's hand. Standard monitoring was ASA and BIS.
**Results:** We obtained 118 anonymous responses (64% experts >5 years). Fig1 and Fig2 show some distribution responses.




*[Responses regarding propofol administration]*




*[Distribution responses regarding LOC]*

**Conclusion(s):** The survey showed that there is a wide variety of methods to assess LOC, a dispersion in anesthesia induction propofol protocols, a lack of experience in the use of TCI systems and in the evaluation of dose/velocity/concentration relationship.
Disagreement about how to perform induction and in the assessment of LOC may reflect that an accurate method does not exist which may lead to the occurrence of overdosage in induction.
**Acknowledgements:** FCT-UID/SEM/50022/2013; SFRH/BD/98915/2013

## 01AP22-11

### Comparison between methods of anaesthesia induction using a combination of TCI and constant infusion rates

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**Background and Goal of Study:** Individual patient requirements for loss of consciousness (LOC) vary widely and ideally, one should perform induction giving exactly what individual patient needs. Induction by a single bolus produces a large overshoot. Otherwise, using effect site (Ce) target controlled infusion (TCI) may overcome overshooting[1], however by increasing Ce target, steps have to be used and induction can be time consuming.
Induction with TCI-view mode and a manually set infusion rate until LOC allows one to stop propofol at LOC identifying the Ce at LOC, but may still result in overshooting. We simulated induction with different combinations of effect site target and continuous infusion rates to identify the induction regime that would minimize the overshoot while not delaying the achievement of Ce of LOC.
**Materials and methods:** Propofol Ce concentrations were calculated using Schnider's PK model. 30 different combinations were obtained using two different start Ce targets (0ug/mL and 2ug/mL), followed by a continuous infusion of 2, 3.3 or 5 mL/kg/h until a fixed Ce-LOC value of 3, 4, 5, 6 or 7 ug/mL was verified.
After this, infusion rate was set to 0. All simulations were obtained for a standard male patient (50 years, 65kg and 170cm). For each simulation, overshoot value was calculated from the ratio between the Ce peak after LOC and the fixed Ce-LOC value. Delay to Ce-LOC (DLOC)was also calculated, as the time elapsed from the start of the infusion to the first time that Ce-LOC value was achieved.
**Results:** The difference between using starting induction with or without a Ce target resulted in a variation of -1.15%±0 and 89.2±10.4sec in overshooting and DLOC, respectively.
For the same target, increasing the infusion rate from 2mL/kg/h to 3.3 mL/kg/h, resulted in a reduction of 240sec in the mean value of DLOC (from 370sec to 130sec), while overshoot mean value increased 4.05% (from 5.85% to 9.90%).
**Conclusion(s):** Our study suggests that the use of a constant infusion rate, when compared to an infusion method with a starting Ce target, may lead to a reduction in time spent until LOC, without increasing the overshoot significantly. For the same starting target, choosing an infusion rate of 3.3mL/kg/h showed significant improvement in the DLOC, without considerably affecting the overshoot value.
**Reference:** 1. IEEE Trans Biomed Eng. 2004 Nov;51(11):1869-75.
**Acknowledgements:** FCT-UID/SEM/50022/2013;SFRH/BD/98915/2013

## 01AP22-12

### Opioid free (OFA) versus opioid (OA) and low opioid anesthesia (LOA) for the laparoscopic gastric bypass surgery. Immediate post operative morbidity and mortality in a single center study on 5061 consecutive patients from March 2011 till June 2015

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**Background:** A prospective database, kept in agreement with the hospital ethical committee of all the patients undergoing gastric bypass surgery since May 2004, contains more than 10 000 consecutive cases. Using all cases (5061) from March 1st 2011 to June 31st 2015 might help to answer the outcome question.
**Methods:** In 2011 total opioid free anesthesia was given by using Clonidine and from 2012 by using dexmedetomidine in a multimodal approach. Around half of the patients were selected for opioid free anesthesia (OFA: 2337), based on the attending anesthesiologist from the first year. A small group got a low opioid anesthesia (LOA: 264) by adding one additive combined with maximum 10 ug Sufentanyl mostly during a transition period. The remaining patients got an opioid anesthesia (OA: 2451) using Sufentanil. (missing info: 9) All major complications up to one month were recorded.
The OFA protocol consisted first of 2-4 ug/kg Clonidine later 0,5-1,0 ug/kg Dexmedetomidine, 1,5 mg/kg Lidocaine, 40 mg/kg Magnesium sulphate, Ketamine less than 50 mg, A procaine 0,1% infusion with 5 mg/kg/h Mg, 0,2 ug/kg/h Clonidine or Dexmedetomidine was continued post operative for the first hours. The OA protocol used Sufentanyl 25-75 ug. The LOA group got maximum 10 ug Sufentanyl at induction and maximum 10 mg Morphine at extubation in combination with one bolus dose of 0,5-1,0 ug/kg Dexmedetomidine or 150 ug Clonidine.
Induction with Propofol and maintained with inhalation and deep NMB. Paracetamol, NSAIDS and opioids, if needed were given as analgetics in all patients.
**Results and discussion:** There was no difference between the 3 groups for gender and BMI. Patients in OFA group were older, had more reinterventions and suffered more from OSAS.
Logistic multivariate analysis shows that OFA reduces major complications (57) compared to LOA (14) and OA (80) while age, male and reinterventions increased it. BMI and OSAS had no impact except in the OA group where OSAS increased complications. OFA patients had less hospitalization days but no difference in readmission, first week re operation or unplanned high dependency unit admission. OFA and LOA needed less postoperative morfine on day 0 (6 mg, 15 mg) compared to OA (26mg). No patient had a leak and the one month death rate was zero.
**Conclusion:** OFA for gastric bypass surgery reduces complications. Age or reinterventions increase the complications for all groups while OSAS is not a risk factor anymore in OFA.

## 01AP23-1

### Effective treatment with dexmedetomidine for severe bronchospasm after pleurodesis procedure

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**Background:** The role of dexmedetomidine solving a case of postoperative bronchospasm in a patient who underwent pleurodesis.
**Case report:** A 63 years old male and 75Kg patient was programed for pleuroscopy and pleurodesis under sedation. Throughout the procedure, patient suffered cough and mild subcutaneous thoracic emphysema. Previous diseases: right pulmonary effusion and upper lobe lung neoplasia. Allergy to metamizol. Usual treatment with inhaled foster. After 2 hours at the PACU, sudden increase of subcutaneous emphysema radiating to neck and face with impaired fonation and cough started. Pleural drainage was repositioned and severe bronchospasm appeared. 0.4mg IM Adrenaline, 10mg IV ketamine and 1,5g IV magnesium was given and placed a 2nd drainage. A continous intravenous infusion of dexmedetomidine 0.5-1 mcg/Kg/h was used, disappearing dyspnea. Patient was transferred to pneumology department with good respiratory state.

**Discussion:** In vitro studies of human and animal bronchial tissue indicate that alpha2-adrenoceptor stimulation lead to smooth muscle relaxation. This effect seems to be mediated *via* a presynaptic mechanism[1]. Dexmedetomidine has been approved for clinical use for sedation of patients who need mechanical ventilation in the intensive care unit. Alpha2-Adrenoceptor stimulation with intravenous dexmedetomidine blocked histamine-induced bronchoconstriction in dogs[2]. Therefore, dexmedetomidine might be beneficial to decrease airway reactivity in patients with chronic obstructive pulmonary disease or asthma[3].

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**Learning points:** Intravenous administration of dexmedetomidine in low doses is an effective treatment to attenuate bronchospasm. Dexmedetomidine could have bronchoprotective effects and might have additional advantages for patients with asthma or chronic obstructive pulmonary disease.

## 01AP23-3

### Survey of use of magnesium sulphate in anaesthesia in Brazil

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**Background and Goal of study:** In recent years has increased the interest in use of magnesium sulphate as an adjuvant drug in anaesthesia for its effects on autonomic response, cardiac arrhythmia, bronchospasm, neuroprotection, among others.The aim of the present study was determine how brazilian anaesthetists use magnesium sulphate in anaesthesia.
**Material and methods:** Prospective transversal survey. After ethical approval, questionnaire was sent to 9869 anaesthetists members of the Brazilian Society of Anesthesiology. Anaesthetists were invited to participate for 3 consecutive occasions with an interval of 15 days between them, through e-mail sent directly by the Brazilian Society of Anesthesiology. Data were submitted to descriptive statistics.
**Results and discussion:** 954 (9.7%) anaesthetists answered to the questionnaire. 337 (35.3%) used magnesium sulphate in anaesthesia. Main indications were: postoperative analgesia, reducing the consumption of anesthetics and neuromuscular blockers, eclampsia, cardiac arrhythmias, prevenction of chronic pain after surgery and prevention hyperalgesia after remifentanila, among others. 334 (99.1%) used intravenous route. Complications listed: arterial hypotension 187 (55.5%), residual neuromuscular blockade 133 (39.5%) and 40 (11.9%) reported no complications. In terms of severity of complications the anaesthetist classified like: minor 227 (65.9%), moderate 77 (22.8%), severe 10 (2,9%), death 1 (0.3%) and 22 (6.5%) did not answer. Intravenous dose most commonly used for induction of general anaesthesia is 30-40 $mg.kg^{-1}$ and during maintenance of general anaesthesia $<30mg.kg^{-1}$. The intravenous dose for sedation was $<30mg.kg^{-1}$.
**Conclusion:** Thirty five per cent of brazilian anaesthetists that answered the survey used magnesium sulphate during anaesthesia on different clinical indications. The results demonstrated potential importance of adjuvant drugs as anaesthesia component, particularly magnesium sulphate.

## 01AP23-4

### Saline (0.9%) vs. Plasma-Lyte® 148 fluid intervention trial in major surgery patients (The SPLIT- Major Surgery study): a single-centred randomised double-blind trial

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**Background and Goal of Study:** The administration of intravenous (IV) crystalloid fluid is a ubiquitous intervention in patients undergoing major surgery. We conducted a prospective Phase 4, single centre blinded study investigating the safety and efficacy of using Saline (0.9%) (Baxter Healthcare, Australia) or Plasma-lyte® 148 (Baxter Healthcare, Australia) as perioperative fluid therapy in adult patients undergoing major surgery.
**Materials and methods:** Blinded study fluid was used for all intraoperative and postoperative crystalloid therapy, until hospital discharge. Preoperative surgical and anaesthesia management, including use of colloids, blood and other blood products, were at the discretion of the attending anaesthesia and surgical teams.
**Results and discussion:** 1100 patients were recruited. Patients in both groups had similar baseline characteristics. Intraoperatively there were no significant differences in the types of surgery. 1100 patients (100%) received intraoperative Trial fluid; 746 patients received Plasma-lyte® 148 and 634 patients received Saline (0.9%). The median (IQR) amount Trial fluid received was greater in the Plasma-lyte® group: 2000ml (1000:2000) vs. 1925 ml (1000:2000) in the Saline group ($p=0.007$). Duration of surgery was similar in both groups. Patients receiving Saline a developed a transient hyperchloraemic metabolic acidosis on postoperative Day 1 compared to patients receiving Plasma-lyte®. Postoperatively, there were no differences in the incidence of AKI between the group: 52 (10.9%) patients in the Plasma-lyte® group developed a postoperative AKI compared to 59 (9.3%) patients in the saline group ($p=0.41$, 95%CI: 0.6 to 1.2). Patients who developed an AKI were older, had larger volumes of fluid both intraoperatively and on postoperative Day 1, and had greater fluid balances intraoperatively and on postoperative Day 1. There were no differences in the development of postoperative complications between the groups. Median (IQR) length of stay was almost identical in both groups (Plasma-lyte® 5.0 days (2.77:8.98) vs. Saline 5.0 days (2.81:9.04).
**Conclusions:** In patients undergoing major surgery, there were no differences in length of hospital stay, incidence of AKI or the development of postoperative complications in patients who received Plasma-lyte® or Saline for perioperative fluid intervention. Patients who received Saline developed a transient hyperchloraemic metabolic acidosis on postoperative Day 1.

## 01AP23-5

### Non-contact measurement of syringe volume using a moving laser

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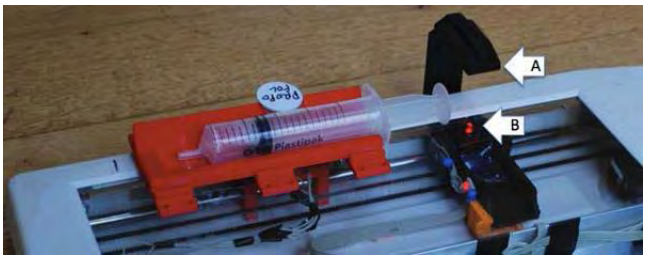
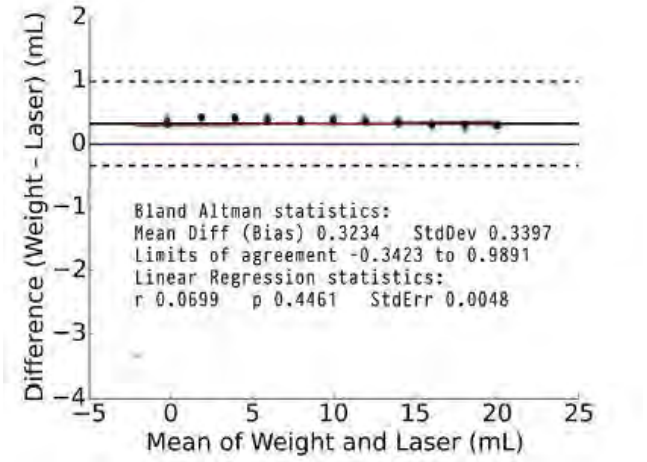
**Background and goals:** Automatic recording of administered drug doses is the “missing link” in a fully automated record keeping system for anaesthesia. Currently a manual record is easier to complete than one using membrane keyboards or onscreen menus. A previous bar-coded label and weighing of syringes1 method was limited by difficulties of measuring small weights in the theatre environment. Our objective was to investigate a non-contact device designed to recognise a syringe, and calculate incremental volumes of administered drugs by changes in position of the syringe plunger relative to the barrel.
**Materials and methods:** The device recognises individual syringes via unique radio frequency tags within syringe drug labels. A randomly determined sequence of 121 volumes of distilled water (0 to 20 mL in 2 mL increments) were drawn up in a 20ml syringe, which was weighed using precision digital scales to determine the net weight of water in the syringe. The syringe was placed in a V shaped cradle on the device and the distance to the plunger was measured automatically by interruption of a moving laser beam (Fig 1), from which the volume of water in the syringe was calculated by the device. Bland Altman analysis (Fig 2) was used to compare the volume of water measured by the device (‘laser’) with the volume determined by net weight of water (‘weight’).
**Conclusions:** The device error was consistent over the entire range of syringe lengths measured, and the readings were repeatable. Accuracy was sufficient for clinical use.

**Reference:** 1. EJ Anaesthesiol 2004: 21(S32); A101




*[Figure 1. A moving laser (B) acting on sensor (A)]*




*[Figure 2. Bland Altman plot. Syringe volume derived from weight, compared to volume estimates using laser device. Mean difference (Bias) (black solid line) = 0.3234 mL (i.e. under reading); Limits of agreement (95% CI = Bias +/- 1 SE) (black dashed line) = -0.3423 to 0.9891 mL; Regression line (solid red line); Line of Equality (Difference = 0) (solid blue line)]*

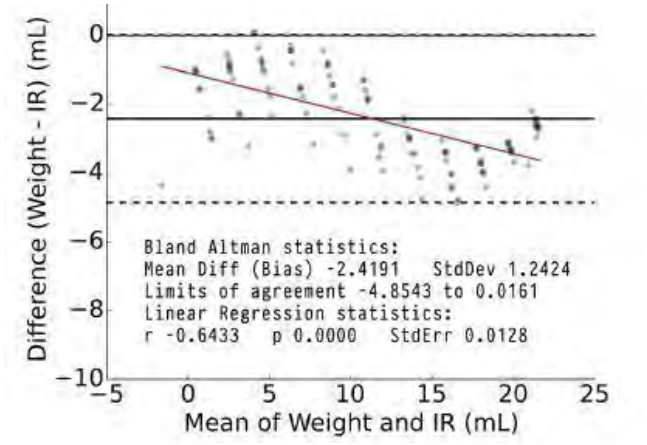
## 01AP23-6

### Non-contact measurement of syringe volume using an infra red (IR) time-of-flight sensor

Eagle B., Williams D., Dingley J.
*Morriston Hospital, Dept of Anaesthesiology, Swansea, United Kingdom*

**Background and goals:** Automatic recording of administered drug doses is the "missing link" in a fully automated record keeping system for anaesthesia. Currently a manual record is easier to complete than one using keyboards or on-screen menus.
A previous bar-coded label and weighing of syringes1 method was limited by difficulties of measuring small weights in the theatre environment. Our objective was to investigate a non-contact device designed to recognise a syringe, and calculate incremental volumes of administered drugs by changes in position of the syringe plunger relative to the barrel.
**Materials and methods:** The device recognises individual syringes via unique radio frequency tags within syringe drug labels. A randomly determined sequence of 121 volumes of distilled water (0 to 20 mL in 2 mL increments) were drawn up in a 20ml syringe, and weighed using precision digital scales to determine the net weight of water in the syringe. The syringe was placed in a V shaped cradle on the device and the distance to the plunger was measured automatically by time-of-flight measurement of an IR beam (Fig 1), from which the volume of water in the syringe was calculated by the device. Bland Altman analysis (Fig 2) was used to compare the volume of water measured by the device (‚IR') with the volume determined by net weight of water (‚weight').
**Conclusions:** The device over read at high syringe volumes and vice-versa. This could be corrected by a simple algorithm; however the spread of values across the measurement range indicates that the device is too inaccurate for clinical use. This sensor has only recently become available, and it is likely that accuracy will improve with further development.
**Reference:** 1. EJ Anaesthesiol 2004: 21(S32); A101


*[Figure 1. Sensor measures time taken for IR light]*




*[Figure 2. Bland Altman plot. Syringe volume derived from weight, compared to volume estimates using infrared time-of-flight non-contact device. Mean difference (Bias) (black solid line) = -2.4191 mL (i.e. over reading); Limits of agreement (95% CI = Bias +/- 1 SE) (black dashed line) = -4.8543 to 0.0161 mL; Regression line (solid red line); Line of Equality (Difference = 0) (solid blue line)]*

## 01AP23-7

### Anaesthetic hypersensitivity reactions in France between 2011 and 2012: report of the 10th GERAP epidemiologic survey

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Immediate hypersensitivity reactions during anaesthesia are rare but potentially life-threatening. The epidemiology changes with time and evolving professional practice, so needs to be monitored. Our objective was to follow this epidemiology.
This was a retrospective, observational study in French hospital clinics, conducted by GERAP members. Consecutive patients seen in allergo-anaesthesia outpatient clinics, who had experienced a hypersensitivity reaction during anaesthesia between 1 January 2011 and 31 December 2012, were included. Demographic data, allergy history, drugs received before the reaction, symptoms of the reaction, results of blood samples (histamine, tryptase, IgE-specific assays) and results of the allergy assessment were recorded.
The most common causes of allergic reactions were NMBA (N=302; 60.6%) (Table 1), antibiotics (N=91, 18.2%, Cephalosporin N= 49, 10%) and dyes (N=27; 5.4%). Latex was involved in 26 cases (5.2%), hypnotics in 11 cases (2.2%) and opioids in 7 cases (1.4%). Rocuronium had the highest rate of reaction, (13.8 reactions/100 000 vials sold) followed by Suxamethonium (13.3/100 000 vials sold). Cisatracurium had the lowest rate of reaction (0.4/100 000 vials sold). Patients were sensitized to two or more NMBA in 48.9% of cases. Cross-sensitivity was between suxamethonium and rocuronium was frequent (30,6%) as cross sensitivity between rocuronium and cisatracurium (30,2%). Cross-sensitized reactions between suxamethonium and cisatracurium were uncommon (17,6%). Without testing, cross sensitivity can't be predicted especially between Suxamethonium and Rocuronium.

| NMBA | Number of reactions | % of reactions | Market share (2011-2012) Number of vials | % of market share | Number of reactions for 100,000 vials sold |
|---|---|---|---|---|---|
| Rocuronium | 32 | 10.6 | 231847 | 2.2 | 13.8 (CI 9.0-18.6) |
| Suxamethonium | 206 | 68.2 | 1548630 | 14.7 | 13.3 (CI 11.5-15.1) |
| Vecuronium | 5 | 1.7 | 156270 | 1.5 | 3.2 (CI 0.4-6.0) |
| Atracurium | 42 | 13.9 | 3789677 | 36.1 | 1.1 (CI 0.8-1.4) |
| Mivacurium | 1 | 0.3 | 162783 | 1.5 | 0.6 (CI 0-1.8) |
| Cisatracurium | 16 | 5.3 | 4552495 | 43.3 | 0.4 (CI 0.2-0.6) |
| Total | 302 | 100 | 10511412 | 100 | 2.9 (CI 2.6-3.2) |

*[Table 1: NMBA IgE-mediated reactions]*

NMBA are still the most frequently triggering allergen, with strong differences between drugs, but they are now followed by antibiotics, (of which greater than 50% were cephalosporins) and dyes. Anaesthesiologists must be aware of existing differences between drugs and of these new emerging allergens. For safe future anaesthesia, allergy assessment is essential.

## 01AP23-8

### Outcomes associated with the inadvertent administration of penicillin to patients previously reporting an allergy

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**Background and Goal of Study:** Penicillin allergy is reported by 11% of inpatients[1]. We have investigated the clinical and incident report outcomes where penicillin was given to a patient who has previously reported a penicillin allergy.
**Materials and methods:** We performed a search of the Trust's incident reporting database using the terms "medication error" with "infections" between 24th March 2011-15. We excluded reports concerning non-penicillin antibiotics. Incident forms and patient notes were reviewed to establish precipitating events and clinical outcome. Patient harm was classified using the National Patient Safety Agency grading of incidents[2].
**Results and discussion:** We identified 69 incident reports (inpatient wards 23, A&E 16, theatres 12, paediatric unit 7, maternity 2, critical care 1). The patient received the drug in 57 cases (83%). No harm occurred in 52 cases (91%). Mild and moderate harm were experienced in 4 (7%) and 1 (2%) cases respectively with no occasions of severe harm or death. Patients experiencing mild harm all developed a rash. One patient developed anaphylaxis and cardiac arrest and was successfully resuscitated with no sequelae. Analysis of events suggested most common risk factors were prescriptions within A&E, patients with decreased GCS, delayed allergy reporting, delay to obtaining previous notes and changes to antibiotics following bacterial sensitivities. Following the incident there were no cases where allergy follow-up occurred. Adverse outcomes following the inadvertent administration of penicillin is rare, likely due to few patients being truly allergic[1]. Penicillin allergy has been associated with increased total hospital days, increased incidence of resistant organisms[1] and cost to healthcare through use of alternative agents. Incident follow-up focuses on the error without the need to investigate the allergy diagnosis.
**Conclusion(s):** Referral to an allergy service may suggest a patient can receive penicillin safely and allow more appropriate first-line antibiotic choices. Despite this requiring expanded allergy services, healthcare cost savings have been previously demonstrated[1].
**References:**
[1]Macy E and Ngor E. Safely diagnosing clinical significant penicillin allergy using only penicilloyl-poly-lycine, penicillin and oral amoxicillin. The Journal of Allergy and Clinical Immunology: In practice 2013; 1(3): 258-263
[2]National Patient Safety Agency. Seven steps to patient safety. The full reference guide. July 2004 pp 100

## 01AP23-9

### Transdermal delivery systems: Is there overdose risk? A case report

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**Background:** The number of patients chronically treated with opioids has increased with the growing use of opioids to treat chronic pain.[1]
The transdermal delivery systems (TDDS) allow the desired systemic effect to take place by administrating medication through transcutaneous route, at a predetermined rate. During perioperative period, fluid and temperature changes can lead to erratic medication absorption.[2,3]
We describe a clinical case of buprenorphine overdose.
**Case report:** A 91-year-old female patient, 70Kg, chronically medicated with buprenorphine TDDS 35$\mu$g/hour for cancer pain, presented with intestinal occlusion and was admitted for urgent exploratory laparotomy under general anaesthesia. We decided to keep the TDDS in the perioperative period.
We administered propofol 80mg, fentanyl 0,1mg, rocuronium 60mg and maintained anaesthesia with sevoflurane.
We administered 2000ml of crystalloids. The patient lost about 1000ml of gastric content, 500ml of urine and 500ml of blood.
For postoperative analgesia, we administered paracetamol 1000mg and morphine 4mg, titrated in bolus of 2mg.
The procedure took 2 hours. In the end, we administered ondansetron 4mg and sugammadex 150mg. After 30 minutes, there wasn't any expired anaesthetic gas and the patient didn't respond to verbal nor painful stimulus and hadn't returned spontaneous ventilation.
We administered naloxone 80$\mu$g and the patient initiated spontaneous ventilation afterwards. She was extubated and transferred to the post anaesthesia care unit.
**Discussion:** The acute and chronic pain teams should assess chronically opioid treated patients before surgery, and elaborate an ideal analgesic plan for those patients.
Since it was an urgent surgery, we decided to keep the TDDS on the patient. Although we avoided heating systems, the intraoperative fluid shift led to increased buprenorphine absorption, with a consequent overdose in an opioid tolerant patient.
**References:**
1. Lewis N, Williams J. Contin Educ Anaesth Crit Care Pain 2005; 5(4):127-129
2. Kopf A, Banzhaf A, Stein C. Best Pract Res Clin Anaesthesiol 2005; 19(1):59-76
3. Margetts L, Sawyer R. Contin Educ Anaesth Crit Care Pain 2007; 7(5):171-176
**Learning points:**
1. Anesthesiologists must be aware of the influence of perioperative period on the TDDS absorption rate.
2. When in surgeries with great-anticipated blood volume changes or fluid shift, the TDDS should be removed and equianalgesic doses of opioid should be administered to the patients.

## 01AP23-10

### Impact of chronic ivabradine treatment in patients undergoing general anesthesia - a retrospective study

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**Background and Goal of Study:** Ivabradine (IVA) is a new drug approved for the treatment of angina pectoris and heart failure(1). By blocking funny channels at the sinus node, IVA produces selective heart rate (HR) reduction without depressing cardiac contractility. Our primary goal was to determine whether chronic ivabradine treatment is associated with a blunted tachycardic response to sympathetically mediated stimulation.
**Materials and methods:** In this retrospective case-control study at the University Hospital of Geneva, we screened patients chronically treated with IVA scheduled for non-cardiac surgery under general anaesthesia in 2013 and 2014. The IVA group was divided in 2 subgroups according to preoperative baseline HR: those with a HR<76 bpm, reflecting effective blockade of cardiac pacemaker (IVA+) and those with a HR>75 bpm (IVA-), suggestive of inadequate treatment. The Control group included untreated patients matched

to IVA patients by gender, age and weight. The primary endpoint was the maximal HR change following intubation (OTI) and surgical incision (SI). One-way or repeated measures (RM) ANOVA were used to compare differences within/between groups. Results are presented as median [95% confidence interval of the difference].
**Results and discussion:** We identified 18 patients chronically treated with IVA, of which 8 (44%) presented a baseline HR<76 bpm (IVA+). Patients in the IVA+ group presented no significant change in HR following OTI (+3[-4-14] bpm) whereas HR acceleration was observed in IVA- (+15[7-23] bpm) and Control patients (+15[9-21] bpm) (p=0.0197 for Group and p<0.0001 for Time effect). Anesthetic drug dosage before intubation didn't differ among the three study groups (p=0.184 for propofol and p=0.642 for sufentanyl). Following SI, patients in IVA+ group showed no change in HR (+2[-7-12] bpm) while significant tachycardia was observed in IVA- (+9[5-18] bpm) and Control (+7[1-13] bpm) groups (p=0.0586 for Group and p=0.0005 for Time effect). There was no significant change in blood pressure associated with OTI or SI (p=0.33 and p=0.0657 for Time effect, respectively).
**Conclusion:** These findings suggest that effective IVA treatment prevents sympathetically-mediated tachycardia following orotracheal intubation and surgical incision. Further studies should focus on potential cardioprotective effect of IVA in high-risk patients submitted to non-cardiac surgery.
**Reference:** 1. Swedberg K et al. Lancet 2010.

## 01AP23-11

### Type and crossmatch tests in urologic elective surgery: our practice and thoughts for the future

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**Background and Goal of Study:** Preoperative blood orders for surgical procedures are defined by the Maximum Surgical Blood Order Schedule (MSBOS). Thirty years after its creation, the MSBOS needs to be updated. Recently, new protocols with new indications have urged. However, they are inconsistent between centers and don't take account to the pre-operative haemoglobin (Hb) value. One of the most consistent protocols was recently published by John Hopkins Hospital (JHH). Our main goal was to identify if type and crossmatch tests (T/C) in patients undergoing urologic elective surgery in our center are in line with JHH's recommendations. As a secundary objective we wanted to identify the percentage of red blood cells units (RBCU) previously studied that were administrated in the first perioperative 48 hours, and if the baseline value of Hb was associated with the transfusion decision.
**Materials and methods:** Study in which the number of RBCU studied before each urologic elective surgery in the period of 2 months were evaluated, as well as the ones that were transfused in the first 48h. The patients were divided into two groups accordingly to the needs of T/C defined by JHH's MSBOS. Within the group with indication to do T/C, an association between pre-operative Hb and transfusion realisation was tested with a T-Student Test. Patients with pre-operative Hb values that solely justified the RBCU transfusion were excluded.
**Results:** From October 1st to November 30th of 2015, 92 surgical interventions were registered with an adequate Hb value. Patient's average age was 64 years (SD14,2), 70 of them being males (74%), and they had an average Hb level of 13,6 g/dL (SD1,7). 66 RBCU were studied and 9 were transfused. In the group without indication for T/C, 19% where studied, and in the group with indication 28% were not submitted to T/C. In the total of the studied patients 15% where transfused, and in the group with T/C indication, RBCU was administered in 16% of them. In the latter group, with an average Hb value of 13,4 g/dL (SD1,9), the pre-operative Hb value was associated with the need to transfuse the patient in the first 48h (p=0,01; SD 0,5-3,6).
**Conclusions:** The lack of institutional protocols contributes to disparities in the indication to execute preoperative blood orders. Our results suggest that a higher threshold may be necessary for this indication, and that the pre-operative Hb value should integrate the decision algorithm.

## 01AP24-1

### Inadequate emergence after laparoscopic surgery in Trendelemburg position. Second preliminary analysis

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**Background and Goal of Study:** Emergence from anesthesia should be smooth and uneventful. In laparoscopic surgery especially in Trendelenburg position, changes in pulmonary physiology and gas exchange could affect brain homeostasis resulting in psychomotor agitation or slow recovery of consciousness.
In our series we analyze if these patients in Trendelenburg position have a higher incidence of undesirable emergence compared to patients who also underwent laparoscopic surgery but not in Trendelenburg.
**Materials and methods:** This was an observational and prospective study in our center. Patients undergone laparoscopic surgery from June to October 2014 were included. Demographic data, perioperative risk factors for inadequate emergence were registered. The main outcome was the Richmond Agitation-Sedation Scale (RASS) score after 10 minutes of admission to post-anesthetic care unit (PACU). We classified RASS ≥ +1 and ≤ -2 as improper emergence respectively, were classified as hyper and hypoactive. Secondary outcome was pain, registered at the same time, using the visual analogic scale (VAS). VAS>5 was defined as significant pain score.
**Results and discussion:** We analyzed 136 patients who underwent laparoscopic surgical procedures, urologycal 45, abdominal surgery 67 and gynecological 26. 60 were women and 76 men; mean age 56.4 years; mean Body Mass Iindex 28.31 Kg/m2; ASA Physical Status: ASA I 22, ASA II 87 and ASA III 27 and no ASA IV. There were 71 Trendelenburg position.
Overall incidence of inadequate emergence was 28.68% (n=39), 12.5% (n=17) were hypoactive and 16.17% (n=22) hyperactive. In the Trendelenburg group, the incidence of improper awakening was 17.65% (n=24) and in the control group 11.03% (n=15) with an RR=0.682692 (CI=0.3937-1.1837). VAS at RASS obtaining time was ≥ 5 in 21.32% (n=29) of total sample.
No relationship was found between inadequate awakening and VAS scale with ANOVA.
**Conclusion(s):** Because of the single-center nature and the small sample size our results lacks of statistical significance, but it seems to show that there are not differences between both groups.

## 01AP24-2

### Post-operative ileus: what are the associated risk factors?

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**Background and Goal of Study:** Post-operative ileus(POI) is the temporary impairment in gastrointestinal motility following surgery. It has a multifactorial origin and is an important cause of morbidity after abdominal surgery. Many strategies have been developed in order to identify the predictive factors of POI which may enable preventive measures.
This study aimed at identifying the perioperative risk factors (RF) associated with POI in patients undergoing colorectal surgery (CRS).
**Materials and methods:** This was a retrospective observational study including 57 patients undertaking CRS in general surgery unit of Hospital Santo António dos Capuchos. Data were extracted from intraoperative records and electronic processes. Cases were stratified by the occurrence of clinician-diagnosed POI. POI was defined by the absence of cramps, passage of flatus or stool on or after 72 hours post-surgery. Results were analyzed using SPSS17.0. Frequencies (Chi-square), univariate (Mann-Whitney test) and regression analysis were done to identify significant associations and RF.
**Results and discussion:** From a total of 57patients, 28,1% developed POI. The associated variables were:time(t) of nasogastric(NG) tube decompression (p<0,001, OR1,07;IC 95%:1,03-1,12), t of bowel rest (p<0,001,OR1,05; IC 95%:1,02-1,08), t to ambulation (p<0,001,OR1,06;IC 95%:1,02-1,10), and opioids (OP) administration route (p=0,024). Development of POI was higher after epidural (EP) OP (OR5,06; IC 95%:1,24-20,59). POI developed in 3(17,6%) patients receiving intravenous (IV) tramadol (T), 10 (30,30%) receiving EP morphine (M) and 3 (50%) receiving EP sufentanil. In patients receiving IV M by PCA (7) none developed POI.

The retrospective character and the reduced sample size limited the capacity to identify other potentially associated variables and to determine the weight of each factor in the development of POI.
**Conclusion(s):** Prospective studies which allow the stratification of POI risk in the pre-operative period and the adoption of effective measures that enable POI prevention are needed. Development of POI is related to many variables. Early ambulation and oral feeding, and reduced time of NG decompression should be encouraged. Regarding the anesthetic technique, the OP type and administration route have to be considered. Of IV OP, T and IV PCA M showed a trend towards lower incidence of POI. For the EP route, M showed the best results. IV T and IV PCA M should be considered for patients undertaking CRS.

## 01AP24-4

### NIBP difference between both arms. An example of bad management. A case report

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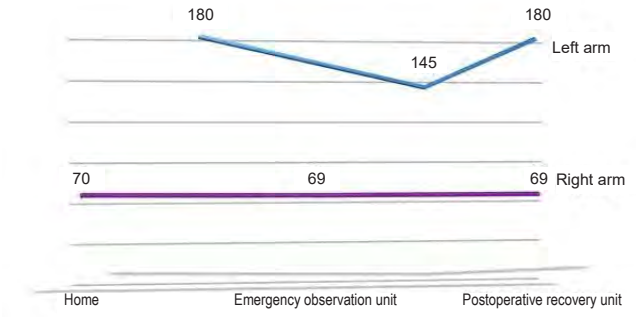
**Background:** Non invasive blood pressure (NIBP) is one of the essential parameters in the perioperative setting. Although symptomatic subclavian artery stenosis are not very common, they may induce us to misinterpret the NIBP measurements.
**Case report:** We present a case of an 79 year-old man with clinical history of isquemic cardiopathy, high blood pressure and mild cognitive impairment. The patient is found at home by the ambulance with low blood pressure (70/40) and abdominal pain. Given the cardiac history, doctors decide to administer a dobutamin perfussion and transfer to our center. The first blood pressure measured in the emergency room is 180/95, so dobutamin is stopped and the patient is reevaluated as an acute abdominal pain. Ecography and posterior TC are needed to diagnose a cholecystitis with free perihepatic fluid. New NIBP results are 69/40, and leukocytosis, and Elevated PCR are found in the blood analysis, so assuming that a septic process is developing, we decide emergency surgery for laparoscopic cholecystectomy. When patient is received, NIBP is 145/80.After surgery, at the recovery unit, the NIBP in the right arm value is 70/40, so noradrenaline (NA) perfussion is started at 0.15mcg/Kg/min while a left arterial catheter is canalyzed. The left invasive arterial value was 180/90, so stop NA perfussion and we changed the NIBP to left arm, and lower limbs with values very similar to the arterial catheter. The patient was discharged with no complications. A thoracic angioTC was performed to evaluate the difference between both upper limb NIBP, and a complete obstruction of the right subclavian artery with good distal vasculta-rization was found. No further procedures were needed
**Discussion:** NIBP is one of the basic pillars of the monitorization, but as every value that can be obtained in the perioperative setting, we have to be cautious and correlate it with the clinical situation of the patient. Asintomatic complete Subclavian origin thrombosis are uncommon. It is supposed to be related to atherosclerosis process. This thrombosis can produce a very low NIBP in the affected limb, inducing us to fail in our management.




*[Evolution of NIBP]*

## 01AP24-5

### Extreme Bezold-Jarish reflex - a case report

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**Background:** The Bezold-Jarish Reflex, which is part of the triad of hypopnea, bradycardia and hypotension caused by a parasympathetic stimulation in the presence or absence of sympathetic block, occurs frequently in our daily practice as anesthesiologists, although in most cases there are no major clinical consequences.
There are many causes which trigger this reflex, such as the hemorrhage/hypovolemia, inferior cava vein compression during pregnancy, tissue manipulation with parasympathetic fibers or psychological stimuli. The common point is that they all cause a decreased cardiac venous return.
The gold-standard treatment of this reflex is the removal of the stimulus, if possible. If not detected or it is impossible to remove, anticholinergics can be used (such as atropine), or alternatively, especially if severe hypotension is present is indicated the use of sympathomimetics (such as ephedrine), since it has effect on either the increase in heart rate either in the blood pressure.
**Case report:** Despite also be described in regional blocks, the following case report occurred during a balanced general anesthesia. It was a 75 years old female patient, ASA II, with an history of depression and arterial hypertension, who underwent a laparoscopic right hemicolectomy for colon cancer, converted to a laparotomy during the procedure, which held without complications. At the end of the procedure, surgeons began a peritoneal lavage with cold saline by mistake which led to stimulation of parasympathetic fibers present in the abdomen. Instantly, the patient suffered a decrease in heart rate that culminated in seconds in assystoly. It was administered immediately atropine, but blood circulation returns only when irrigation fluid on the abdomen was suctioned. After this episode, the surgery finished and the patient recovered from anesthesia without any registered complications. The patient was hospitalized for 29 days, and ended up dying as a result of Septic Shock with starting point on the infection in the surgical wound.
**Discussion and learning Points:** As Anesthesiologists, we witness a large percentage of this reflex every day, that is easily detected and reversed with conventional or pharmacological measures. However, as seen in this case, we must be prepared for rapid identification of the precipitating cause, avoiding serious consequences that can change the course of surgical treatment.

## 01AP24-6

### Perioperative management of coexistent fat oxidation defect and malignant hyperthermia

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**Background:** We present the anesthetic management of an adult with an unusual and challenging combination of multiple acyl-CoA dehydrogenase deficiency (MADD) and malignant hyperthermia.
**Case report:** A 28 year old male with late-onset MADD and malignant hyperthermia presented for elective urethroplasty. Anesthetic considerations for this patient included avoidance of inhalational agents and management of impaired oxidation of fatty acids with prolonged propofol infusion. Metabolic disturbances were minimized by giving clear fluids 2 hours prior to surgery and starting a 10% dextrose infusion on admission. Anesthesia was induced and maintained with propofol and remifentanil. Serial blood gases, blood glucose, lactate and creatine kinase levels were measured to rule out metabolic disturbances from the disease process itself and prolonged propofol infusion. The post operative period was uneventful.
**Discussion:** MADD, also known as glutaric aciduria type 2 (GA2), is an autosomal recessive inborn error of metabolism affecting the oxidation of fatty acids. MADD is caused by deficiency of either an electron-transfer flavoprotein (ETF) or an electron-transfer flavoprotein dehydrogenase (ETFDH)[1]. The incidence of this disease is unknown. The mitochondrial electron transport chain can be affected by propofol. Anesthetic managment has been described using both total intravenous anesthesia and volatile anesthetics[2]. In our case volatile anesthetics had to be avoided and patients with mitochondrial disorder are at a higher risk to develop propofol infusion syndrome.
**References:**
1. Olsen RK, Olpin SE, Andresen BS, Miedzybrodzka ZH, Pourfarzam M, Merinero B, et al . ETFDH mutations as a major cause of riboflavin-responsive multiple acyl-CoA dehydrogenation deficiency. Brain 2007; 130:2045-54.

2. Farag E, Argalious M, Narouze S, DeBoer GE, Tome J. The anesthetic management of ventricular septal defect (VSD) repair in a child with mitochondrial cytopathy. Can J Anaesth. 2002;49(9):958-962.
**Learning points:** The perioperative concerns for patients with mitochondrial disease include maintenance of normoglycemia, normothermia and reducing metabolic stress. There are also concerns with use of propofol as beta oxidation of fatty acids are impaired especially with prolonged infusions. This rare presentation of both malignant hyperthermia and fat oxidation defects highlights the implication of these pathophysiological processes in the perioperative period.

## 01AP24-8

### Preoperative pregnancy testing in a university hospital in the UK

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**Background and Goal:** Anaesthesia and surgery during unidentified pregnancy could result in risk to mother or fetus or both[1]. Some patients may require imaging intraoperatively and pregnancy should be ruled out prior to surgery. American Society of Anesthesiologists' Preanesthesia Task Force' allow physicians and hospitals to implement their own policies and practices on preoperative (Pop) pregnancy testing (PT). Frequency of incidentally found POp pregnancy ranges from 0.34% to 2.4%[2]. In UK, NICE recommends POpPT should be ‚considered' following informed consent for all women of reproductive age group (WRAG) and ‚definitely' on those who claim that they could be pregnant[3].
Objective of this study was to identify if all WRAG were enquired about pregnancy status in the immediate Pop period, performance of POp urine PT and incidence of unexpected pregnancy.
**Methods:** We interrogated our theatre database to identify WRAG (16-55 years) who underwent non-obstetric procedures at Cambridge University Hospital. Electronic clinical notes were reviewed for a period of 8 weeks.
**Results:** A total of 511 patients were identified; 99.6% were enquired on possibility of pregnancy. 1% said they could be pregnant and 3.8% were unsure of possibility of pregnancy; of these PT was documented negative in 24%. Possibility of pregnancy was denied by 94.7% and of them PT was negative in 17%; 25% were not tested for reasons documented as denial, recent menstruation, sexually inactive or hysterectomy; 57% were not tested and no reasons documented. POpPT were performed more routinely in daycare unit (81%) than those admitted to main hospital wards (12%).
**Conclusion:** Incidence of positive POpPT in our sample was 0%. Almost all WRAG were asked about pregnancy status. Urine PT was performed in only 24% of women who were unsure of pregnancy status. There were some inconsistencies in checking and documenting POpPT between wards. By presenting this data to staff and rolling out some information leaflets we hope to increase awareness and hence, improve performance.
Detecting unknown pregnancy could provide an opportunity to discuss and cancel elective surgery or alter perioperative management. This simple but significant test could potentially avoid or reduce harm to both mother and unborn baby.
**References:**
1. RRR011: Checking pregnancy before surgery. *NPSA,London2010*
2. Maher et al. Preoperative Pregnancy testing. *Can J Plast Surg.2012;20:32-4*.
3. NICE cg 3: Preoperative Tests. *NICE,London2003*.

## 01AP24-9

### Insulin overdose consequences and management during general anesthesia - a case report

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**Background:** Insulin overdose case reports in the literature are commonly described in the context of suicide attempts. Hypoglycemic encephalopathy is the most feared consequence. We present a case of accidental insulin overdose (ten times the adequate dose) during general anesthesia, describing its consequences as well as a successful intra and postoperative management.
**Case report:** A 57-year-old man with insulin-dependent diabetes and a preoperatively HgA1c of 8,6% was scheduled for a radical prostatectomy. A combined general anesthesia was induced and after that a glucose test was undertaken. Towards a value of 262mg/dL, and accordingly to our institution protocol, it was decided to administer 6U of intravenous insulin Actrapid®. Inadvertently, due to a lack of dilution, the anesthetist nurse administered 60U instead. A glucose test was promptly performed showing a result of 60mg/dL. For that 20mL of dextrose 30% was administered and the maintenance fluid changed to a 5% dextrose physiologic saline solution. Based on its pharmacokinetics, glucose levels were monitored every 15 minutes on the first hour and every 30 minutes after (272, 286, 264, 209, 166, 170mg/dL). No serum electrolyte abnormalities were detected. The surgery lasted two hours and since there was glucose blood levels stability the patient was awaked without any complication. In the post anesthetics care unit glucose levels were monitored: 145, 164, 159, 135, 120, 113, and 107 mg/dL. An intravenous line with 5% dextrose was maintained at a 42mL/h rate for 24h. No hemodynamic instability occurred. During the rest of the hospital stay, regular glucose blood levels were under control. Any other treatment was needed. Patient was discharged on day 4 after surgery referred to a consult of endocrinology for a better control of diabetes.
**Discussion:** Proper training of insulin preparation should prevent insulin overdose and periodic monitoring of glucose levels after insulin administration should never be forgotten.
**Learning points:** In the presence of hypoglycemia, anesthesiologists should have a low threshold for initiating dextrose infusion and admitting these patients for frequent glucose and serum electrolyte monitoring. Early treatment remains the key to optimizing prognosis after insulin overdose and hypoglycemia.

## 01AP24-10

### The right pressure on Pompe

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**Background:** Pompe disease (PD) is a rare and progressive autosomal recessive disorder caused by a deficiency of the enzyme acid a-glucosidase that degrades the glycogen into glucose in the lysosomal and is found mainly in skeletal and cardiac muscle. The presentation of this disorder depends on the age of onset, how quick it evolves and the degree of organ involvement. Late-onset disease presents as slowly progressive myopathy with or without lung involvement and no severe cardiac involvement[1]. Here we report the anesthetic management of a patient with late-onset PD.
**Case report:** Male, 51 years old, with PD, causing moderate to severe restrictive respiratory syndrome requiring non-invasive pressure ventilation (NIPV) was scheduled for total thyroidectomy. Preoperative evaluation was normal, including thyroid and cardiac function. After preparing the operating room under the protocol prevention of Malignant Hyperthermia (MH), the patient was monitored according to ASA standard (including invasive blood pressure, neuromuscular and anesthetic depth monitoring). Anesthesia was induced and maintained with remifentanil and propofol. Sugammadex was used for reversal of neuromuscular blockade induced by rocuronium. In the immediate postoperative period, CPAP was initiated and the patient was transferred to the High Dependency Care Unit, remaining there for 48 hours with excellent adaptation. Serial ABG's showed adequate oxygenation and ventilation.
**Discussion:** Most information on anesthetic approach of PD comes from cases with onset in childhood, with few reports in adults[2,3]. The progressive loss of pulmonary muscle function heightens the risk of aspiration, atelectasis, infection and respiratory failure in the perioperative period. Early institution of NIPV proved effective in preventing these complications and minimizing complications associated with prolonged ventilation. The prevention of MH should also be considered in these patients.

**References:**
1.Pompe disease diagnosis and management guideline. Genet Med. 2006 May;8(5):267-88.
2.Combined general and epidural anesthesia for major abdominal surgery in a patient with Pompe disease. J Anesth. 2010 Oct;24(5):768-73
**Learning points:** The perioperative management of patients with PD requires a multidisciplinary team approach. Early institution of NIPV and patient adaptation is paramount in preoperative optimization and allows a faster recovery of respiratory function in the postoperative period.

## 01AP24-11

### Perioperative Anaphylaxis: a different presentation

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**Background:** Anaphylaxis is a rare devastating occurrence in the perioperative period with an estimated incidence of 1 in 3 500 to 1 in 20 000 surgeries and mortality rate of 3-9%[1].We report an unusual presentation of anaphylaxis during general anaesthesia.
**Case report:** A 69 y.o man, ASA 2, with colon cancer for laparoscopic right hemicolectomy, no comorbidities, previous surgeries or known allergies. During induction he received cefoxitin fentanyl, propofol, rocuronium and dexamethasone. After endotracheal intubation the patient presented with pallor, sinus tachycardia, undetectable end tidal CO2, severe hypotension with little response to ephedrine, ST depression in inferior leads and no bronchospasm. Volume expansion with crystalloids was started. 20 min later, a cutaneous macular rash arose, on face and torso. Hydrocortisone and clemastine were given. By then the patient presented hemodynamic stability and normal ST segment. Due to periocular and glottis oedema, the patient was transferred to ICU intubated, with favourable evolution. Serum triptase measurements confirmed the anaphylactic nature of the reaction and the skin tests positive for rocuronium. A month later, the patient was anesthetized for the surgery with etomidate and atracurium, which was uneventful.
**Discussion:** Anaphylaxis can be challenging to diagnose in the operating room. Unspecific symptoms and absent typical signs can make it difficult to differentiate from other causes of shock, delaying the diagnose. This clinical presentation of anaphylactic shock is uncommon when cardiovascular collapse is associated with tachycardia and absent cutaneous vasodilation in the early stages. Activation of the sympathetic nervous system may account for these changes, and once there is restoration of peripheral perfusion and cutaneous vasodilation, epinephrine administration should be carefully reeavaluated.[2] Serum tryptase levels and skin testing are imperative in the etiological diagnosis and seeking alternatives.
**References:**
1. Kannan J,et al. J Immunol Allerg Clin N Am 2015; 35:321-334
2. Dewachter P, et al. Curr Allerg Asthma Rep 2015;15:21
**Learning points:** The anaesthesiologist should be alert for anaphylaxis in patients with cardiovascular collapse without apparent cause, non-responsive to conventional treatment. Delays in diagnosis and in the mainstay treatment can contribute to increase morbidity and mortality. Adequate follow up is crucial in investigating the cause and seeking safer alternatives.

## 01AP24-12

### What to do when an actively bleeding, adult, legally competent Jehovah's Witness proposed for an urgent surgery consciously refuses a blood transfusion? The Portuguese perspective

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**Background:** Jehovah's Witness patients ordinarily refuse blood products, which leads to important constraints in perioperative management when a blood transfusion is deemed to be life-saving. Different bioethical and legal principles collide in these cases, of which anaesthesiologists caring for these patients should be aware.
**Case report:** Female, 65 years old patient submitted to right hemicolectomy for a malignant tumour in the ileocecal appendix. 1 hour after arrival to the postanaesthetic care unit she is hypotensive, oliguric, with ill-perfused extremities, capillary refill time 4 seconds, with active bleeding as evidenced by a haematic drainage of 400 cc. The patient is still neurologically intact, and still refuses a blood transfusion, keeping with her living will determinations previously expressed. The decision is made to reintervene, but abstention from using blood products clearly threatens the vital prognosis of the patient.
**Discussion:** In these cases fundamental Bioethical principles collide, namely those of Autonomy, Beneficence, Non-Maleficence and Justice. Because Anaesthesiologists are the last barrier of defence for the patient intraoperatively, it is not surprising that they have to deal with these issues up close, and interestingly an inquiry showed that they were the most likely group to transfuse patients against their will[1]. Legal codes[2] usually reflect Bioethical principles, and they too tend to mirror some of the confusion surrounding the matter in Bioethical terms. Approval of the "Living Will" legislation in Portugal[3] has clarified the matter and hierarchized the principles involved in favour of patient autonomy.
**References:**
1. Cahana A, Weibel H, Hurst SA. Ethical Decision-Making: Do Anesthesiologists, Surgeons, Nurse Anesthetists, and Surgical Nurses Reason Similarly. Pain Medicine. 2008;9:728-736.
2. Portuguese Penal Code;
3. Bill 25/2012 dated July 16th.
**Learning points:** In light of modern Portuguese legislation, and in line with what has been happening worldwide, patient autonomy must be respected provided it is based on free, informed decisions.

## 01AP25-1

### Clinical manifestations of cisatracurium at multiple doses under inhalation anesthesia

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**Background:** Doses of cisatracurium to facilitate intubation in adults were recommended from 0.10 mg/kg (2 × $ED_{95}$) to 0.20 mg/kg (4 × $ED_{95}$). Larger doses of neuromuscular blocker show more rapid onset, but longer duration of muscle relaxation.{1-3}This study was designed to evaluate clinical characteristics of cisatacurium at three different doses of 0.1mg/kg (2 × $ED_{95}$), 0.15mg/kg (3× $ED_{95}$), and 0.2mg/kg (4 × $ED_{95}$) with inhalation anesthesia, and compared with rocuronium (2 × $ED_{95}$).
**Materials and methods:** Patients were randomly assigned to four groups of 15 - CIS 0.10 (cisatracurium 0.1mg/kg), CIS 0.15 (cisatracurium 0.15mg/kg), CIS 0.2 (cisatracurium 0.2mg/kg), and ROC 0.6 (rocuronium 0.6mg/kg). Neuromuscular function was assessed by train-of-four monitoring. General anesthesia was induced with 2.0 mg/kg propofol. 100% oxygen and 4.0 Vol % of sevoflurane and maintained with 50% oxygen/50% nitrous oxide and 1.5-2.5 Vol% of sevoflurane. The onset time was determined as the time to reach maximal relaxation, from administration of neuromuscular blocking agents to zero count of TOF. The clinical duration of muscle relaxation was determined as duration from maximum relaxation to reappearance of the three or more count of TOF.
**Results:** There were no significant differences in the demographic data including age, sex, height, weight, and ASA physical status between the four groupsOnset times were 307.3 ± 66.3 sec for CIS 0.1, 237.3 ± 65.8 sec for CIS 0.15, 153.3 ± 62.3 sec for CIS 0.20, and 168.7 ± 33.9 sec for ROC 0.60.

Similar onset times were observed for the CIS 0.20 group and ROC 0.60 group (p=0.16), The clinical durations were 33.3 ± 6.7 min for CIS 0.1, 48.1 ± 5.3 min for CIS 0.15, 62.1 ± 9.2 min for CIS 0.20, and 45.8 ± 6.4 min for ROC 0.60. Onset time of the CIS 0.10, 0.15 group was significantly longer than that of the ROC 0.60 group (p<0.01). clinical durations within CIS groups were directly dose dependent.
**Conclusion:** We concluded that a single high dose of cisatracurium 0.2mg/kg (4 × ED95) is more suitable for rapid tracheal intubation and around 1hr operation. The single dose of cisatracurium 0.1mg/kg and 0.15 mg/kg might be a better choice in the case of a brief surgery within 1hr, but onset times for intubation were relatively longer than for rocuronium 0.6mg/kg.

## 01AP25-2

### The effect of deep versus moderate neuromuscular block on surgical conditions in bariatric laparoscopic surgery: a randomized, double blind clinical trial

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**Background and Goal of the Study:** In recent literature it is has been suggested that deep neuromuscular block (NMB) improves surgical conditions during laparoscopy. However, the evidence supporting this statement is limited and this was not investigated in laparoscopic bariatric surgery. We tested the hypothesis that deep NMB could improve the quality of surgical conditions for laparoscopic bariatric surgery. This study was funded by MSD.
**Materials and methods:** Eligible patients were over 18 years of age and were obese or morbidly obese as defined by a BMI of >30kg/m$^2$ and >40kg/m$^2$, respectively and scheduled to undergo a laparoscopic gastric bypass surgery. Patients with an ASA physical status class IV or higher were excluded from the study. Patients were stratified according to their BMI and evenly randomized over a deep NMB-group (rocuronium bolus and infusion maintaining a posttetanic count of 1-2) and a moderate NMB-group (rocuronium bolus and top-ups maintaining a train-of-four count of 1-2). Anaesthesia was induced and maintained with propofol and remifentanil in both groups. Patients were ventilated with an $O_2$:air mixture of 50:50 to achieve an end-tidal $CO_2$ of 30-35mmHg. The primary outcome measure was the quality of surgical conditions assessed by a single surgeon using a 5-point rating scale (1=extremely poor, 5=optimal). Secondary outcome measures were the number of intra-abdominal pressure rises >15cmH2O as measured by the $CO_2$-insufflator and the duration of surgery. Data are presented as mean±SEM.
**Results and discussion:** After IRB approval and obtaining informed consent, 60 patients were included. There was no statistically significant difference in the surgeon's rating regarding the quality of the surgical field between the deep and moderate NMB-group (4.2±0.2 *vs.* 3.9±0.2; P=0.08). In the deep NMB-group, the quality of surgical conditions was rated as optimal in 53% of the cases *vs.* 33% in the moderate NMB-group (P=0.06). The number of intra-abdominal pressure rises > 15 cmH2O was not statistically different between the deep- and moderate NMB-group (0.2±0.2 *vs.* 0.3±0.2; P=0.3). The duration of surgery was markedly shorter in the deep NMB-group than in the moderate NMB-group (61±3min *vs.* 88±17min; P=0.02).
**Conclusions:** Compared with a moderate NMB, deep NMB failed to improve the surgeon's rating of operating conditions during laparoscopic bariatric surgery notwithstanding the fact that the duration of surgery was significantly shortened.

## 01AP25-3

### Residual neuromuscular block at a Spanish tertiary referral hospital - security concerns in daily practice

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**Background and Goal of Study:** TOF ratio (TOFr) >0.9 is the safety threshold for extubation after non-depolarizing neuromuscular blocking agents (NMBA) have been used. The only way to measure TOFr is using quantitative neuromuscular monitors. Considering the risks related to post-operative residual curarization (swallowing dysfunction and impaired respiratory function), TOF monitors should be included in preoperative security checks, and their routine use should be encouraged. The WHO checklist does not consider this item yet.
The aim of this audit is to detect the incidence of residual neuromuscular block in post-operative patients and to describe the use of TOF monitor at our tertiary referral hospital.
**Materials and methods:** Patients receiving NMBA were audited at PACU admission within 15 minutes after extubation in theatre.
TOF Watch SX Monitor (Avalon Medical) was used to detect residual paralysis using a 30 mA and 0.5 Hz setting at abductor pollicis. In case of TOFr <0.9 the test was repeated three times with the same setting.
Temperature, TOF ratio, time and last NMBA dose given, extubation time, administration of reversal (sugammadex or neostigmine) at extubation were recorded.
Critical events and need for reintubation within 1 hour were assessed.
**Results and discussion:** 60 consecutive patients were audited from 20th Oct 2015 to 1st Dec 2015. All the patients received rocuronium prior to intubation.
Residual paralysis was detected in 16 patients (27%), with TOF ratio ranging from 0 (TOF count=3) to 0.9.
44 patients (73%) presented a TOFr >0.9.
TOF monitor was not used in any of the 60 patients that were audited.
No clinical weakness or respiratory critical events were observed.
The use of neuromuscular block monitors in our hospital is low. Most studies suggest that quantitative monitoring of neuromuscular paralysis is essential, yet availability of TOF Watch monitors is poor.
Clinical signs can detect only deep residual block, but are not reliable for a safe extubation.
Complete neuromuscular block recovery should be guaranteed for every patient before extubation.
**Conclusion(s):** Incidence of residual block remains high in post-operative patients. This data show TOF Watch is not used as a routine monitor in our hospital. The inclusion of a TOF monitor in every theatre is widely indicated but still poor. Anaesthesiologists should be aware of the risk of residual muscular block at sign out.

## 01AP25-4

### Metabolism of remimazolam in primary human hepatocytes during continuous long-term infusion (five days) in a 3D bioreactor system

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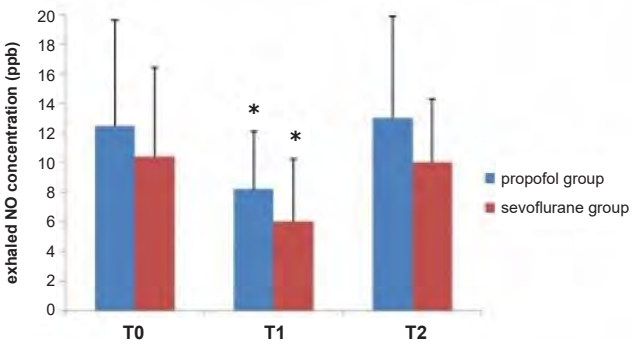
**Background and Goal of Study:** Remimazolam is an ultra-short acting benzodiazepine under development for procedural sedation and general anesthesia. It is a benzodiazepine ester that is rapidly hydrolyzed by carboxylesterase (CES-1A) to an inactive metabolite (CNS7054). As the performance of CES1A during long-term-exposure to remimazolam is unknown, the present study was designed to test the *in-vitro* metabolism of Remimazolam under conditions allowing continuous exposure to remimazolam and its principal metabolite.
**Materials and methods:** Possible changes in Remimazolam metabolism upon long-term exposure were investigated in an *in vitro* 3D bioreactor system, which allows for high-density perfusion culture of cells reflecting the natural situation in the organ. Bioreactors were inoculated with primary human hepatocytes (n=4) and Remimazolam was continuously infused into the

bioreactors over 5 days (final concentration 3000 ng/mL =6.8 $\mu$M) in parallel with untreated control bioreactors. Static 2D cultures of hepatocytes from the same donors were investigated as a further control of cell viability and possible cytotoxicity of Remimazolam, though with non-continuous application of the drug via daily medium exchange.
**Results and discussion:** Measurements of metabolic and clinical chemistry parameters (glucose, lactate, urea, LDH, AST, ALT, GLDH) in culture supernatants indicated no noxious effect of Remimazolam or its metabolite on hepatocyte integrity in 3D bioreactors or 2D cultures. Analysis of the time-course of Remimazolam and CNS7054 in 3D bioreactors revealed values in the range of unbound concentrations observed in patients. Remimazolam levels declined within the first 8 h (initial value approx. 1,600, steady-state around 250 ng/ml). Concentrations of CNS7054 showed an inverse time-course reaching average values of 1,500 ng/ml. In 2D cultures Remimazolam was completely metabolised during 24h until the next medium exchange over the whole experiment duration of 5 days, with a corresponding increase of the metabolite. Analysis of mRNA expression levels of CES-1 indicated no changes in enzyme expression over the culture period.
**Conclusions:** The results of the present study indicate a stable function of CES1A during a 5 day continuous exposure to clinically relevant concentrations of Remimazolam. Moreover, there was no indication for a harmful effect of Remimazolam exposure on integrity and metabolic activity of primary human hepatocytes.



*[fig.1]*

**Conclusion:** Both propofol and sevoflurane lead to temporary inhibition of NO exhalation. They also seem to attenuate systemic hypersensitivity response by reducing the eosinophil count in the peripheral blood, with propofol displaying a more pronounced effect. Attenuation of NO exhalation by both agents may be one of the underlying mechanisms in the reduction of airway hyperreactivity.
**Reference:** Antus B, et al. Respir Med 2010; 104:1377-80

## 01AP25-5

### Effect of type of general anaesthesia maintenance on exhaled nitric oxide and eosinophil blood count

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**Background:** Nitric oxide (NO) is considered an inflammatory marker of the airway and can be used as a means of detecting airway hyperresponsiveness, since patients experiencing bronchospasm intraoperatively or postoperatively display higher levels of exhaled NO. The aim of the present study was to investigate the differential impact of two general anaesthesia maintenance techniques on exhaled NO and eosinophil blood count.
**Materials and methods:** This is an interim analysis of patients subjected to total or subtotal thyroidectomy under general anaesthesia. Twenty one patients were randomized to anaesthesia maintenance with propofol and eighteen patients to anaesthesia maintenance with sevoflurane. Patients with a history of allergy and those with a history of airway hyperreactivity (such as those with asthma or bronchitis) were excluded. Exhaled NO was measured immediately before induction with the NObreath® device and blood was sampled for eosinophil count measurement (T0). After emergence, and when the patients' Aldrete score was ≥8, exhaled NO was measured again and blood was sampled for a second time (T1). Finally, exhaled NO was measured 24 hours postoperatively (T2). Exhaled NO fluctuation in the two groups was analyzed by ANOVA for repeated measures and eosinophil variation within groups with Wilcoxon signed-rank test.
**Results and discussion:** Both the propofol and sevoflurane group displayed decreased NO exhalation postoperatively (T1) in comparison to baseline values (T0). Twenty four hours postoperatively (T2), exhaled NO was no longer different from baseline in both groups (fig.1). In the peripheral blood, a decrease in the percentage of eosinophils was demonstrated, which was significant only in the propofol group.

## 01AP25-6

### Risk stratification and prediction model in anesthesia for intraoperative adult patients

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**Background and Goal of Study:** Having and predicting a dynamic general physiological risk level for an intraoperative patient is desired knowledge in anesthesia. In this model, we made an application which computes an analysis for risk stratification and prediction. This analysis potentially answers the question "What level is the patient's physiological status".
**Materials and methods:** This application explores the use of machine learning techniques to implement stratification and predictive model for the specific and general physiologic risk. For this project, we used Public available Data from the University of Auckland Dataset. The data includes 14 patients, 23 physiologic signals collected over 69 h from 0.1 Hz from the Datex-Ohmeda S5 anaesthetic monitor in a separate file formatted in combined CSV/XML structure.
Sequential five physiological parameters were presented in this model: Heart rate, Systolic blood pressure, Diastolic blood pressure, Oxygen Saturation, and End Tidal Carbon Dioxide. Based on specific physiologic values, we computed general physiological risk and stratified on five levels: Normal, Low, Moderate, High and Very High. The general physiological risk is based on the sum of five physiological parameters and we call that "A risk".
The model represents the implementation of three supervised machine learning algorithms: Linear Discriminant Analysis, Classification Regression Trees and Random Forest on the patient's dataset.
The shiny package is used in this application written in R language and it gives great flexibility in application's input controls and simulations output.
**Results and discussion:** During analysis, different models were evaluated to find the best fit with the highest accuracy rate. In the confusion matrix table it was observed that Random Forest models produced better results compared to Linear Discriminant Analysis and Classification Regression Trees. Machine-learning classifiers correctly predicted general physiologic risk with an accuracy above 95% (95% confidence intervals [CI] (0.95-0.99) of all intraoperative patients.
**Conclusion(s):** The results revealed that gathered data from intraoperative monitoring are usable for general physiological risk classification and prediction.
Perhaps this model approach could be used to predict real-time risk stratification for patient's physiological status.
**Reference:**
https://albiondervishi.shinyapps.io/AnesthesiaProject

## 01AP25-7

### Training and confidence in providing total intravenous anaesthesia: a national audit of anaesthetists in Ireland

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**Background and Goal of Study:** Total Intravenous Anaesthesia (TIVA) is a less commonly used than inhalational vapour based anaesthesia (VBA). TIVA is preferred to VBA in those at high risk of postoperative nausea and vomiting, and those susceptible to malignant hyperthermia. TIVA is not a core competency for Irish anaesthesia trainees. The National Audit Project 5 (NAP 5)[1] reported 28 cases of probable/possible accidental awareness under general anaesthesia (AAGA) involving intravenous anaesthesia, 75% of which were considered preventable. NAP 5 recommendations included:
· All anaesthetists should be trained in the maintenance of anaesthesia with intravenous infusions.
· Anaesthetic organisations should establish a set of standards and recommendations for best practice in TIVA.
We aimed to quantify teaching opportunities for anaesthesia trainees and to ascertain confidence in providing TIVA in both trainees and consultants.
**Materials and methods:** Online survey circulated to all trainees (262) and consultants (395) in Ireland.
**Results and discussion:**
Response rates -
Trainees 45% (95% C.I. for responses +/- 6.7%)
Consultants 16.5% (95% C.I. for responses +/- 11.1%)
5.1% of trainees use TIVA weekly, compared with 32% of consultants
65% of trainees rarely have consultants led teaching in TIVA
69% of trainees felt they have inadequate consultant teaching (TIVA)
80% of consultants felt trainees did not receive enough teaching (TIVA)
Confidence in using TIVA - 25% of all trainees, 42% of senior trainees, 65% consultants
86% of all felt TIVA should be a core competency for training.
**Conclusion(s):** As per NAP 5, TIVA is a risk factor for AAGA. Irish trainees do not receive adequate consultant led teaching in TIVA and anaesthetists of all levels are not confident in providing TIVA. We recommend that the College of Anaesthetists of Ireland defines competency in TIVA for trainees and increases training opportunities.
**References:**
1. The 5th National Audit Project (NAP5) on accidental awareness during general anaesthesia: summary of main findings and risk factors.
Pandit JJ, Andrade J, Bogod DG, et al., British Journal of Anaesthesia 2014; doi: aeu313.

## 01AP25-8

### Quality of recovery after surgery in patients with frailty

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**Introduction:** The concept of frailty describes a clinical state of increased vulnerability. This condition has been identified as a significant predictor of adverse postoperative outcome despite surgical and anesthetic advances. The aim of this study was to evaluate the influence of frailty in postoperative recovery.
**Materials and Methods:** After approval by the institutional ethics committee, an observational, prospective study was performed in patients scheduled for elective surgery. The included patients older than 18 years, undergoing urologic, plastic, gynecologic and general surgery, under general anesthesia, admitted to the Post Anesthetic Care Unit (PACU). Exclusion criteria were: inability to give informed consent and regional anesthesia. Before surgery, patient's vulnerability was evaluated through the Clinical Frailty Scale and patients were classified as frail patients (FP) if they had a score $\geq 4$. The PQRS and the Quality of Recovery 15 score (QoR-15) were used to evaluate the quality of recovery after surgery. PQRS was used at baseline (up to 14 days before surgery) and after surgery at minute 15 (T15), 40 (T40) and days 1 (D1) and 3 (D3) to evaluate recovery in five domains: physiological (PD), nociceptive (ND), emotive (ED), activities of daily living (AD) and cognition (CD). Recovery was defined as return to baseline values for all questions in each domain. The Mann-Whitney test, Chi-square or Fisher's exact test were used for comparisons.
**Results:** Of 208 patients, 13% were considered FP. FP were older ($p<0.001$). FP had lower median QoR scores at D0 (118 vs. 123, $p=0.003$) but at D1 scores were similar. For PD, the rate of recovery was similar in both groups at T15 and T40 but at D1 FP recovered less frequently (33% vs. 59%, $p=0.012$). FP recovered less frequently in ED at T15 (13% vs. 48%, $p=0.001$) and at T40 (13% vs. 44%, $p=0.002$). Postoperative recovery at CD was better in FP at D1 (44% vs. 24%, $p=0.023$). Rates of recovery for AD were similar at all time frames.
**Conclusion:** Patient's vulnerability and hence their postoperative recovery was evidenced by different rates of recovery in PQRS. FP patients had a worse health status as evidenced by QoR15 before surgery but this scale was not able to identify a poor quality of recovery in frail patients.

## 01AP25-9

### Comparison of the effect of propofol and sevoflurane on cytokine synthesis and hepatic histology in a porcine model of extensive (85%) liver resection

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**Background and Goal of Study:** Extensive liver resections can cause an increase in portal pressure, a reduction of arterial flow, an inflammatory response carried out by several cytokines (pro and anti-inflammatory), and histological changes that can bring to liver failure (SFSS, Small-for-size syndrome). Anesthetic drugs alter hepatic circulation and can modulate inflammatory reaction after liver surgery. This study aims to compare the effect of propofol vs. sevoflurane on cytokines synthesis and liver histology after extensive liver resection (85%).
**Materials and methods:** The study was conducted according to the European Regulation Authorities and was approved by the local Ethics Committee for Animal Experimentation. Ten Mini-pigs were randomized into two groups: five were anesthetized with propofol (group P) and the others with sevoflurane (group S); all were subjected to hepatectomy (85% of the liver). Data were collected at baseline (B) and half an hour after 85% resection (R). Data analyzed: *1) arterial serum analysis:* NO, IL1, IL2, IL4, IL6, IL8, IL10, VEGF, TNF*; 2) liver histology:* analysis of hepatic damage, scored with 1 point per each item of significant liver injury (hemorrhage and congestion, portal and septal edema, endothelial cell detachment, necrosis and apoptosis*)*. Data are expressed as median [interquartile range]. The statistical study was performed with U-Mann- Whitney using SPSS 21.
**Results and discussion:** *Arterial serum analysis*: At B, there was no difference between groups. At R, data showed a significant increase in IL4 in S (P 0.41 [0.37-0.42], S 0.54 [0.52-0.76], $p=0.029$) and also significant increase in IL8 in P (P 16.58 [10.23-26.68], S 6.39 [5.18-7.16, $p=0.008$). As IL4 has an anti-inflammatory effect, and IL8 has a pro-inflammatory effect, propofol could increase the liver injury. *Liver histology:* There was no difference between groups in B. After 85% resection (R), data showed an overall increase in the points of the histological damage for propofol group (P 7 [4.75-9.25], S 2 [1.25-2.75], $p=0.029$).
**Conclusion:** Sevoflurane seems to attenuate the inflammatory response, and reduce histological hepatic damage after an extended liver resection compared with propofol, suggesting a protective effect that may reduce the incidence of SFSS.

## 01AP25-10

### Nociception level (NoL) index alteration after standardized nociceptive stimulus decreases with higher doses of remifentanil

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**Background:** Several indexes have been recently used to monitor nociception intensity during general anesthesia (GA). The PMD-100 monitor (Medasense Biometrics, Israel) is a novel monitor of nociception, presenting the Nociception Level (NoL) Index. The NoL index is a multiparametric index derived from heart rate (HR), HR variability, plethysmograph wave amplitude, skin conductance and its fluctuations. This index ranges from 0 to 100, with lower value meaning lower pain intensity. We tested the NoL alteration during a standardized noxious stimulus at various doses of remifentanil (RF) i.v. infusion, with the hypothesis that the higher the RF dose, the lower the NoL alteration.
**Methods:** 40 patients received desflurane-RF based GA with an epidural analgesia for laparotomy. A moderate noxious stimulus (electrical stimulation 70mA, 100Hz, 30sec) was applied to the forearm of the patients at 4 RF doses varying from 0.005 to 0.15 $\mu g \cdot kg^{-1} \cdot min^{-1}$. For each RF dosage, the pre- and the post-stimulation NoL peak values and the difference (ΔNoL) were recorded and compared using a linear mixed effects model and CI of 95%. Study # NCT02602379.
**Results:** The pre stimulation NoL basal values ranged for 4.2 to 6.5 with no significant difference when RF infusion increased.
The post stimulation values at RF doses of 0.005, 0.05, 0.1 and 0.15 $\mu g \cdot kg^{-1} \cdot min^{-1}$ were, respectively, 38.3, 19.6, 9.8 and 12, showing statistical significant difference between 0.005 and 0.05 $\mu g \cdot kg^{-1} \cdot min^{-1}$ ($p<0.0001$) and between 0.05 and 0.1 $\mu g \cdot kg^{-1} \cdot min^{-1}$ ($p<0.01$) but not at higher doses e.g. between 0.1 and 0.15 $\mu g \cdot kg^{-1} \cdot min^{-1}$ ($p=0.49$).
Accordingly, the ΔNoL was greater at 0.005 than at 0.05 $\mu g \cdot kg^{-1} \cdot min^{-1}$ (28.2 vs 10.7, $p<0.0001$) and at 0.05 than at 0.1 $\mu g \cdot kg^{-1} \cdot min^{-1}$ (10.7 vs 3.6, $p<0.01$) but showed no difference between 0.1 and 0.15 $\mu g \cdot kg^{-1} \cdot min^{-1}$ (3.6 vs 4.5, $p=0.70$).
**Conclusion:** When a patient is exposed to a standardized noxious stimulation, NoL reaches higher peak values and shows greater alteration when the patient is receiving lower doses of RF. In this study, a plateau of minimal NoL variation was reached at 0.1 $\mu g \cdot kg^{-1} \cdot min^{-1}$ of RF. These results show great potential of the NoL index as a tool to monitor nociception intensity during anesthesia. However, further studies are needed to directly compare the NoL index with classical indicators of pain (such as HR and blood pressure) in its ability to better guide intraoperative opioid administration and monitor the nociception level.

## 01AP25-11

### The risk factors of postoperative nausea and vomiting in female population undergoing thyroid or breast surgery in Taiwan

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**Background and Goal of Study:** Female gender is the strongest patient-specific predictor of Postoperative nausea and vomiting (PONV) (OR≈2.6). Clinically, we felt PONV was operation-field-specific, which pointed to the fact that certain operations are gender-specific. High incidence of PONV on women may mask the impact of operative fields. This study aims to clarify whether operation fields are one risk factor of PONV in women undergoing thyroid or breast surgery.
**Materials and methods:** Prospective observations of patients receiving general intubated anesthesia were made in Chia-Yi Christian Hospital. The participants included 294 women undergoing thyroid (n=199)or breast surgery (n=95). The incidence of PONV was assessed. Risk factors, including age, BMI, operation time, opioid doses, anesthetic agent, smoking, history of PONV or carsick were explored using multiple LRA.
**Results and discussion:** The incidence of PONV in PACU and the day after operation was significantly higher in patients receiving breast surgery (62.1%) in comparison to those receiving thyroid surgery (46.2%, P=0.01) but was insignificant on multiple LRA. No significant difference was seen between PONV and any of the other factors (Table 1). Multiple LRA revealed that only longer operation time increased PONV by odds ratio of 2.48 (120-180 mins) and 5.31 (>180minutes).

| | Univariate Regression OR | 95% CI | | p-value | Multivariate Regression OR | 95% CI | | p-value |
|---|---|---|---|---|---|---|---|---|
| Thyroid vs. Breast | 1.90 | 1.15 | 3.13 | 0.01* | 1.43 | 0.83 | 2.48 | 0.20 |
| Anesthesia duration <120min/ 120-180min | 2.34 | 1.36 | 4.03 | 0.002* | 2.48 | 1.39 | 4.41 | 0.002* |
| <120min/ >180min | 5.50 | 2.69 | 11.26 | <0.001* | 5.31 | 2.48 | 11.37 | <.0.001* |
| Totol opioid <7.5 / 7.5-15 mg | 0.88 | 0.43 | 1.79 | 0.73 | 0.87 | 0.53 | 1.43 | 0.58 |
| <7.5/ >15 mg | 0.81 | 0.39 | 1.65 | 0.55 | 1.07 | 0.52 | 2.18 | 0.86 |
| PONV history (Yes/ no) | 0.55 | 0.62 | 1.56 | 0.95 | 0.96 | 0.58 | 1.59 | 0.88 |
| Current smoker (Yes/no) | 1.14 | 0.48 | 2.73 | 0.77 | 0.99 | 0.38 | 2.56 | 0.99 |

*[Table 1. Total PONV or Not]*

**Conclusion(s):** This study confirmed that operation fields are not independent risk factor of PONV in female patients. It was found that the operation time is the only risk factor for PONV incidence in female patients. In line with this finding, prophylactic antiemetic therapy for surgery on women with more than 2 hours of operation time may be indicated.
**References**
1.Apfel, CC, Heidrich, FM, Jukar-Rao, et.al. Evidence-based analysis of risk factors for postoperative nausea and vomiting, Br J Anaesth 109:742-753, 2012.
2.Wu, YH, Sun, HS, Wang, ST, Tseng, A CC. Applicability of risk scores for postoperative nausea and vomiting in a Taiwanese population undergoing general anaesthesia. Anaesth Intensive Care 2015,43:473-478

## 01AP25-12

### Perioperative outcome in Myasthenic gravis' patients under general anaesthesia - a 10 years study

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**Background and Goal of Study:** Myasthenia gravis (MG) is a neuromuscular disease that leads to an abnormal response to neuromuscular blocking (NMB) agents[1].
The aim of this study was to evaluate the relation of NMB use with the clinical condition and postoperative outcomes of patients with MG.
**Materials and methods:** An observational retrospective study was conducted between May 2005 and August 2015. All patients in our institution with MG submitted to general anaesthesia (GA) were included. Patient's demographics and perioperative data were collected from medical records. Descriptive analysis was performed and the Mann-Whitney U test, Fischer's exact test or Chi-square were used. Spearman's correlation was performed. Differences were considered significant when
$p<0.05$.
**Results and discussion:** A total of 41 patients were included, corresponding to 51 surgeries under GA, of which 5 were intravenous anaesthesia. NMB were used in 60.8% of cases without relation with ASA ($p=0.09$) or MG's stage ($p=0.97$). NMB's drug dose weren't influenced by MG's stage ($p=0.42$) neither by the inhaled anaesthetic used ($p=0.61$). We found a relation between use of NMB and HLOS ($p=0.004$) and stay in ICU ($p<0.001$).
However, the type of NMB drug didn't show correlation with HLOS ($p=0.62$). Reversion of NMB was performed with: neostigmine 57.7%, sugamadex 34.6% or both drugs 7.7%; the type drug used wasn't associated with HLOS ($p=0.08$). Balanced GA were maintained with sevoflurane in 81.1% of cases and with desflurane in 18.9%. The inhaled anaesthetic used didn't interfere with the hospital length of stay (HLOS) ($p=0.78$). Duration of anaesthesia was 116.1 minutes in mean, which was associated with longer HLOS ($p=0.68$,

p<0.001) and longer stay in ICU (p=0.7, p<0.001). The mean HLOS was 4.8 days. During the study period 2 (3.9%) myasthenic crisis occurred, both after thymectomies under GA with NMB.
**Conclusion(s):** The NMB use didn't depend on preoperative stage of disease. NMB option had postoperative implications namely longer HLOS and longer stay in ICU. That outcomes didn't relate with NMB reversion drug used. Our results suggest that use of BMN should be judicious. Interestingly a higher duration of anaesthesia was associated with longer stay in ICU and HLOS. Our incidence of complications was low.
**References:**
1. Thavasothy M, Hirsch N. Miasthenia gravis. Br J Anaesth. 2002 Vol 2; 3: 88-90.

# Ambulatory Anaesthesiology

## 02AP01-1

### Ultrasonic assessment of phrenic nerve paralysis after interscalene block with ultrasound guidance versus neurostimulation

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**Introduction:** The aim of our study was to compare the interscalene block (ISB) performed under ultrasound versus nerve stimulation for shoulder arthroscopy, in terms of effectiveness and complications especially paralysis of the phrenic nerve assessed by ultrasound the diaphragm.
**Materials and methods:** We conducted a prospective randomized study including 40 patients admitted for shoulder arthroscopy. Patients were divided in the draw in 2 equal groups:
- Ultrasound group (GE): ISB was conducted under ultrasound guidance.
- Neurostimulation group (GN): ISB neurostimulation according to the technique of Winnie.
We excluded patients with a history of bronchopulmonary disease .We measured before the practice of BIS, SpO2 to the ambient air, the DEP and inspiratory thickness (EI) and expiratory (EE) of the diaphragm is then calculated the thickening fraction (EF) of the diaphragm to using the following formula: EF = (EI -EE) / EI. Measuring the thickness of the diaphragm was performed by an ultrasound probe with a planar-type Sonosite head, high-frequency (10 MHz) used in muscle mode in 2D mode and at a depth of 4 to 6 cm. the probe was placed perpendicularly in the frontal plane between the 8th and 9th intercostal space of the thorax hemi the same side as the member to operate. Statistical analysis was performed using SPSS 22 software.
**Results:** Age(years) 39.7 ± 4.3in GEvs37.8 ± 6.8 GN(p=0.77); BMI(kg/m2): 26.4 ± 1.4GEvs25.4 ± 1.7 GN(p=0.36); Duration of procedure of ISB(min) 6.7 ± 2.3GEvs 7.3 ± 3.6GN(p=0.023); number of attempts: GE(23/20)GP(27/20) p=0.27; bupivacaine injected volume (ml) 19.6 ± 4.3 21.2 ± 3.6 0.17; The needle redirections Impact 1.6 (32/20) 1.5 (30/20) 0.6; The pain associated with the procedure (0-100): GE (17.5 ± 6) vsGN (28 ± 4)p= 0.029; The onset time of sensory block the axillary nerve (min): GE(14.1 ± 2.3) vsGN (17.6 ± 3.9) p= 0.35; Onset of the motor block of the axillary nerve:GE (14.1 ± 2.3) vsGN (17.6 ± 3.9) p=0.35; The duration of the act: GE (54.6 ± 18.9) vs GN (61.2 ± 19.4) p=0,42;Patients satisfied:GE:17 vs 15 GN (p=0.21). We found no cases in the 2 groups, and in no time, the fall of EF <20%, PEF <80% theoretical value or SpO2 <95% The flow volume of the brachial artery was increased by 2 times to H2 and H6 after ISB in both groups.
**Conclusion:** Ultrasonography allows the realization of the BIS in a shorter time than neurostimulation. The paralysis of the phrenic nerve is a common complication of BIS without having a clinical impact on breathing.

## 02AP01-2

### Upper limb surgery in the ambulatory setting: anesthetic technic and recovery time

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**Background and Goals:** Upper limb surgery is an increasingly common procedure in the ambulatory setting. General (GA) and regional (RA) anesthesia are both suitable for this type of surgery. Evidence suggests that RA is associated with reduction in opioid and antiemetic consumption, enhanced pain relief and shortened duration of stay in the postanesthesia care unit (PACU). The goal of this study is to compare duration of stay in the PACU and discharge times of patients undergoing upper limb surgery under GA and RA.
**Materials and methods:** Authors proceeded to a retrospective analysis of patients undergoing upper limb surgery in tertiary-care medical center's ambulatory surgery unit (ASU) over one year (January to December 2014). Data collected from the ambulatory center's database included demographic data, American Society of Anesthesiologists (ASA) physical status score, surgical procedure, type of anesthesia and duration of stay in phase I and II PACU. Statistical analysis was performed with SPSS22.0® (significant level α=0.05).
**Results and discussion:** During this period, 63 patients were submitted to upper limb surgery in this ASU. Average age was 55 years and patients were predominantly male (n=40). Regarding ASA physical status score, 7 patients were classified as ASA III (11,1%), 48 as ASAII (76,2%) and 8 as ASA I(12,7%). The most common procedure was open palmar fasciectomy (n=20, 31,7%) and open carpal tunnel release surgery (n=9, 14,3%).
Concerning anesthetic technique, 39 patients were submitted to GA, 20 underwent ultrasound guided axillary brachial plexus block (US-AxBPB) and 4 underwent local anesthesia performed by the surgeon plus light sedation (LA+S).
Average time of stay in phase I PACU and total time in PACU were shorter in the group of patients submitted to US-AxPBP (97,8'' and 212,8'', respectively) when compared to patients ungergoing GA (152,4'' and 274,2'', respectively), p<0,05. The same was true when GA was compared with LA+S. The was no significant difference between duration of stay in the various phases of PACU when comparing US-AxPBP and LA+S.
No complications associated with the anesthetic technique were recorded.
**Conclusion:** Ultrasound guided axillary brachial plexus block for upper limb surgery in the ambulatory setting seems to be associated with a significant reduction of the duration of stay in all phases of PACU when compared with general anesthesia. This technique seems to have a favorable safety profile.

## 02AP01-3

### Efficacy assessment of different doses of hyperbaric bupivacaine for transobturator tape surgery on an outpatient basis

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**Background and Goal of Study:** Spinal anesthesia (SA) provides better pain control in the intra and postoperative period, reduces opioids consumption and side effects and avoids the need for general anesthesia. However the time associated with the regression of the spinal block may delay discharge under outpatient surgery (OS). For SA, Portuguese Association of Ambulatory Surgery recommends a dose of 7.5 mg hyperbaric bupivacaine. The SA with low dose is a promising alternative due to the unavailability of short acting local anesthetics in our country.
To compare the effectiveness of different doses of bupivacaine in transobturator tape (TOT) surgery in OS.
**Materials and methods:** Assessment of patients submitted to TOT surgery under SA with hyperbaric bupivacaine on an outpatient basis during eigth months. The effectiveness was assessed by adequacy of blocking degree to surgery without the need for conversion to general anesthesia.The impact of dose in the block duration was determined by the delay until discharge to phase II recovery, which is also influenced by foley catheter and vaginal plug removal (1-3 hours after surgery, according to surgeon's criteria).
**Results and discussion:** 63 patients were submitted to TOT surgery under SA, divided into three groups according to the administered dose: Group A - 5 mg (n= 8); Group B - > 5 to 7.5 mg (n = 28) and Group C - > 7.5 mg (maximum: 9mg; n = 26). There were no statistically significant differences between groups in terms of clinical and demographic characteristics. The mean duration of anesthesia was 46 ± 12 minutes.SA was appropriate for

the procedure in all patients receiving 5 mg of hyperbaric bupivacaine.There was one case of conversion to general anesthesia due to insufficient block, in group B (overall effectiveness of SB: 98.4 %).The average delay until phase I discharge was 168 ± 12 minutes and was lower in patients of Group A (125 ± 49min ; Group B: 181 ± 40 minutes ; Group C: 159 ± 41 min), although the difference have been on the threshold of statistical significance ( P = 0.06). There was a report of one complication, related to the surgical technique, that motivated the return to phase I recovery.
**Conclusion(s):** SA performed with a dose of 5 mg hyperbaric bupivacaine seems to have similar efficacy when compared to higher doses in the TOT surgery, with lower phase I recovery discharge times.

## 02AP01-4

### Unanticipated hospital admission after ambulatory surgery - a tertiary care center's experience

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**Background and Goal of Study:** Unanticipated hospital admission after ambulatory surgery is a clinical marker of the utmost importance often used to monitor the quality of care of ambulatory surgery units (ASU).
The main goal of this study is to determine the unanticipated hospital admission rate after ambulatory surgery in our tertiary-care center's ASU, to define the main causes of admission and identify associated factors.
**Materials and methods:** Authors proceeded to a retrospective analysis of the first 30 days of the postoperative period of all patients submitted to surgical procedures in the center's ASU during one-year period (January to December 2014).
**Results and discussion:** During this period, 1169 patients underwent ambulatory surgical procedures requiring anesthesia. Hospital admission rate in the first 30 days after surgery was 1,4% (n=24). Of these, 10 cases were admissions in the immediate postoperative period.
Average age was 44 years and patients were predominantly female (n=15), ASA physical score grade II (n=20) and were submitted to general anesthesia (n=17).
Reasons for unanticipated admission for these 24 patients were classified in 5 categories: surgical (n=15), medical (n=5), anesthetic (n=2) and other reasons (n=2).
Bleeding was the main surgical reason for admission and worsening of preexisting disease was the main medical one. Anesthesia related admissions were linked to drug anaphylaxis in patients with no prior history of drug allergies.
Procedure duration was over 3 hours in 4 of these cases and was the cause of 1 admission. Procedure ending time after 3pm was observed in 5 cases but in neither of them was the cause of admission. Most patients admitted underwent general surgery procedures (n=18).
In this 30 day postoperative period, 76 patients visited the emergency room (ER) but were not admitted to the hospital. Most of these patients went to ER for minor surgical complications (n=32), for follow-up surgical consultation (n=13) and for decompensation of preexisting medical conditions (n=24).
**Conclusion:** Reducing unanticipated hospital admissions following ambulatory surgery can only be met by periodic analysis of each centers context and limitations. These are essential to maintain high quality and safety standards.

## 02AP01-5

### Spinal versus general anesthesia in outpatient transobturator tape surgery

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**Background and Goal of Study:** Outpatient surgery (OS) has grown exponentially, not only because it has advantages for the hospital, but also because it confers benefits and greater patient satisfaction, keeping safety and quality of care.
The progressive aging of the population and the increasing prevalence of obesity in Portugal do predict an increase of patients with multiple comorbidities proposed for OS, which may benefit from a regional technique. However, there are no studies assessing the effectiveness of different anesthetic techniques for transobturator tape surgery (TOT) in OS .
**Materials and methods:** Assessment study of patients undergoing TOT on an outpatient basis in a 8 month period. Demographic data, duration of anesthesia and primary recovery room, as well as events that increased them, were recorded.
**Results and discussion:** 118 patients were evaluated and divided into 2 groups according to the anesthetic technique: Group A (N = 62) - spinal anesthesia (SA) and Group B (N = 56) - balanced general anesthesia (BGA). In respect to demographic characteristics there was a higher prevalence of SA in ASA III (P = 0.015) and obese patients (P = 0.005). There was one insufficient SA case with a dose of 7.5 mg, converted to BGA and recorded as such.
There were no other statistically significant differences between groups in terms of clinical and demographic characteristics.
The mean duration of anesthesia was 44 ± 11 min.
The average delay until discharge from primary recovery was 158 ± 40 min, being significantly lower in Group B (P = 0.018).
The discharge from primary recovery depended on the fulfillment of the White criteria and on the foley catheter and vaginal plug removal (1-3 hours post-surgery, according to surgeon indication).
Although the time for motor blockade reversal has not been evaluated, its persistence may have justified the difference between groups.
In post hoc analysis of the administrated doses of hyperbaric bupivacaine in Group A, it was found that the increase of recovery time wasn't verified with doses of 5 mg (125±49 min). There were two events that prolonged primary recovery times: active bleeding in a patient of Group A and nausea and vomiting in a patient of Group B.
**Conclusion:** Patients undergoing TOT under SA had significantly higher recovery times compared with patients submitted to BGA. However, this difference was not seen with a dose of 5 mg hyperbaric bupivacaine.

## 02AP01-6

### Predictors of desaturation during procedural sedation: a retrospective cohort study

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**Background and Goal:** Since the last decade, procedural sedation and analgesia (PSA) has increased exponentially along with the introduction of complex therapeutically and diagnostic procedures outside the operating room. In addition, more patients with significant co-morbidity received PSA in the outpatient setting (Karamnov et al 2014). Current research demonstrated two general factors that cause hypoxemia during PSA. Firstly, patient-related factors e.g. BMI and ASA classification. Secondly, the type of procedure. We hypothesized that, next to obesity and a higher ASA classification, the site of intervention is a predictor of desaturation during PSA. The goal of this retrospective study was to identify therapeutically and diagnostic interventions which are performed with PSA and were associated with desaturation.
**Methods:** We included patients older than 18 years who received elective procedural sedation in the outpatient department between January 2011 and December 2013 in a single centre retrospective cohort study. The primary endpoint was desaturation defined for at least one minute SpO2 below 90%. We compared desaturation between patients undergoing PSA for endobronchial procedures (EB), in airway (IA) procedures and not in airway (NIA) procedures by calculating absolute risk differences (ARD). Confounding was corrected for with logistic regression.
**Results:** The total cohort consists of 2328 patients. Desaturation occurred in all 3 groups; the EB (n165) 58 (35%), IA (n1382) 207 (15%) , NIA (n781) 108 (14%). The absolute risk difference in desaturation between EB procedures and IA procedures is 20% (95%CI 13% to 28%). The absolute risk difference in desaturation between EB procedures and NIA procedures is 21% (95%CI 14% to 29%). The absolute risk difference between IA procedures and NIA is 1.2% (95%CI -2.0% to 4.1%). Compared to EB procedures the adjusted odds ratio of desaturation during IA procedures and NIA procedures are respectively 0.320 (95%CI 0.224 to 0.455) and 0.307 (95%CI 0.210 to 0.450)
**Conclusion:** In this present study the site of intervention, especially endobronchial procedures, demonstrates to be an independent predictor for desaturation with a SpO2 <90% and a duration of more than one minute during procedural sedation.
**Reference:**
Karamnov S, Sarkisian N, Grammer R, Gross WL, Urman RD: Analysis of Adverse Events Associated With Adult Moderate Procedural Sedation Outside the Operating Room. J Patient Saf 2014.

## 02AP01-7

### Comparison of spraying and nebulized lidocaine in patients undergoing esophago-gastro-duodenoscopy

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**Background and Goal of Study:** Esophago-gastro-duodenoscopy (EGD) is performed under the topical anesthesia of the pharynx either with 2% viscous or 10% liquid lidocaine because it yields a rapid onset with highly safety margin. However, spraying lidocaine was stated to be an annoying maneuver to the patients. While nebulized lidocaine appeared to be efficient to suppress the gag and cough reflex as in airway anesthesia. We compare the effectiveness of spraying and nebulized lidocaine for patients undergoing EGD.
**Materials and methods:** This study has been approved by Siriraj Institutional Review Board, and a written informed consent was obtained from all subjects. A total of 110 patients undergoing elective EGD, with neither history of lidocaine intolerance nor irritable airways due to smoking, COPD, upper respiratory infection, asthma as well as cardiac and pulmonary diseases and allergy to lidocaine, were included in the study. All patients were randomized into two groups: A-spraying lidocaine 5 puffs (10mg/puff) were administered 4 times at 5-minute interval, up to the total dose of 200mg; and B-nebulized lidocaine 250mg were administered via a nebulization kit with oxygen face mask of 7 LPM for 15 minutes prior to the commence of EGD. The procedure was performed by the same board-certified endoscopist. The co-researcher who was blinded to the lidocaine administration technique, assessed the ease of esophageal instrumentation as difficult, poor, fair or excellent. Both the endoscopist and the patients expressed their satisfaction by using the Numerical Rating Scale. The data expressed as mean and standard deviation. P <0.05 with 95% confidence interval was considered statistically significant difference.
**Results and discussion:** The spraying lidocaine seemed to be a practical maneuver for the endoscopist to deal with the patients during the procedure. However, nebulized lidocaine was well-accepted, since the technique familiarizes as the way of oxygen administration via face mask.
**Conclusion(s):** The endoscopist expressed her approval in spraying lidocaine in terms of less time to start the procedure, ease for instrumentation, less gag reflex during the procedure, less presence of hypersecretion and smooth operation. However, participants showed in favor of nebulized lidocaine administration.

## 02AP01-8

### Do we use too much propofol for sedation in colonoscopy? Observational study with SedLine monitor

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**Background and Goal of Study:** Propofol and midazolam are popular sedative drugs in colonoscopy. Our aim is to observe the depth and duration of sedation propofol-fentanyl and midazolam-fentanyl based sedation in patients undergoing colonoscopy using an electroencephalogram (EEG) based SEDLine monitor(Sedline Inc., San Diego, CA).
**Materials and methods:** After obtained ethical council approval, 108 consenting adults studied in this non-randomized, prospective, observational research. Patients with ASA class I-II-III, aged between 18-80 years, who underwent colonoscopy with propofol-fentanyl (GroupP) (0,5-3 mg/kg-1μg/kg) or midazolam-fentanyl (Group M)(0,03-0,3 mg/kg-1μg/kg) sedation, were included. We prefer to use midazolam based sedation for comorbid patients,whereas for others propofol, in our routine clinical practice. Demographic variables, depth of sedation and recovery times were recorded. Sedation was administered by anesthetists, who were blinded to patient state index (PSI). The depth of sedation was measured and recorded with EEG based SEDLine monitor. PSI values at colonoscope insertion, removal, and at return of verbal responsiveness after colonoscope withdrawal were documented. Sedation spectrum was retrieved from the data stored on SEDLine monitor.
**Results and discussion:** Patients in Group P were younger (p<0.0001) and has lower ASA scores (p=0.02) than Group M patients. Group P patients experienced significantly deeper degrees of sedation at all times and longer sedation and recovery times (p<0.0001 and p=0.01). Group P patients were more deeply sedated and had lower PSI values in the 5th minute (p<0.0001) and lower PSI scores after recovery(p<0.0001). In Group M, who had more comorbidity, had more stable PSI values. Also, their sedation levels were closer to normal sedation levels.
**Conclusion(s):** This study is the first study so far regarding SEDline monitoring in Turkey. We realized that when used the clinical signs for sedation, propofol was excessively used more than necessity. In literature, midazolam is associated with delayed discharge and decreased patient satisfaction. Propofol provides better patient satisfaction, although its overdose is more common. EEG based monitorization can lead to more objective, uncomplicated and tolerable sedation. Consequential lighter titrations of sedative drugs may result in improved patient care such as lowering risk of aspiration, hypotension, delayed discharge.

## 02AP01-9

### Sedation in ALS patient with dexmedetomidine for gastrostomy

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**Background:** Amyotrophic Lateral Sclerosis(ALS) is a neurodegenerative disease that causes progressive weakness and wasting of muscles. It affects mostly males, a shows a survival of 3-5 years. One variation is progressive bulbar palsy with symptoms including difficulty swallowing, loss of speech, weakness and atrophy of facial muscles and tongue [1]. dexmedetomidine, an alpha 2-agonist, has sedative and analgesic effects sparing respiratory drive[2]. We report the case of a patient with end stage bulbar type ALS requiring gastrostomy as a palliative measure, under moderate sedation.
**Case report:** 80 year old woman with advanced bulbar palsy due to ALS was scheduled for gastrostomy, which requires sedation technique due to previous intolerance. Patient was found not suited for tracheostomy nor non-invasive ventilation.After obtaining informed consent, we proceeded to basic vital signs monitoring and management with VK 50% O2 (SV: FC: 85lpm, TA: 110/70, SatO2: 96%). Afterwards an initial slow bolus of dexmedetomidine 0.5 ug / kg was administered in 10 minutes followed by an infusion of 0,7 ug / kg / hr. An additional 10mg of propofol iv was administered to begin the procedure an perfusion was increased to 1 ug / kg / hr to achieve a moderated level of sedation without significant hemodynamic changes nor any type of ventilatory depression. Patient was fit after gastrostomy and could be discharged to the ward after 1 hour at the postoperative recovery unit.
**Discussion:** In ALS patients, there is a reduced capacity of the respiratory muscles and cough reflexes are similarly affected. In this case in order not to use the usual sedative because of the risk of further respiratory depression we chose dexmedetomidine because of its ability to provide both sedation and analgesia while preserving ventilatory function.
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2. Coursin, Dexmedetomidine, Currente Opinion in Critical Care. August 2001. Vol 7 - Issue 4: pp 221 - 226
**Learning points:** The aim of sedation in bulbar ALS patient is to avoid respiratory depression.
Dexmedetomidine is a hypnotic that preserves the ventilatory function.

## 02AP01-10

### Comparison between single dose paravertebral block and thoracic epidural block for breast surgeries: a prospective randomized study

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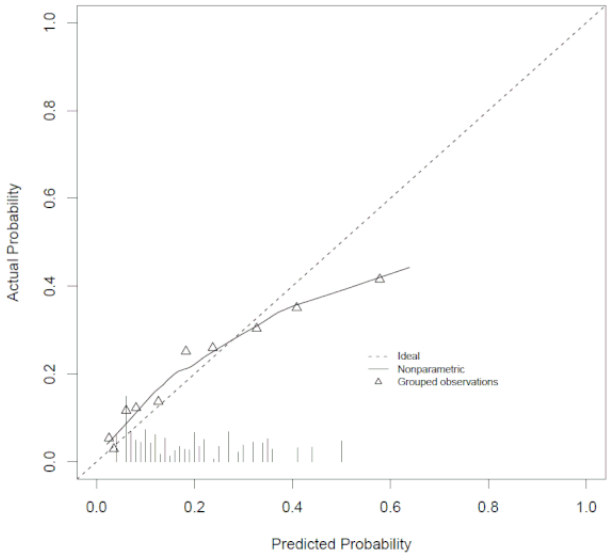
**Background and Goal of Study:** Both paravertebral block (PVB) and thoracic epidural block (TEB) are established techniques for post-operative pain relief in thoracic and breast surgeries. Breast surgeries are associated with post-operative pain, nausea and vomiting. With medical advances and rise in ambulatory surgeries there is a growing interest towards regional anaesthesia for breast surgeries. Our study compares two known regional techniques with

sedation as the sole anaesthetic plan for benign breast surgeries in terms of intraoperative haemodynamics, post-operative pain, side effects and patient satisfaction.

**Materials and methods:** After ethical committee approval, 80 patients scheduled for unilateral simple mastectomy were randomized to receive either TEB or PVB. The anaesthetic and analgesic protocols were similar in both groups. Patients in each group received 15 ml of 0.5% Bupivacaine either in the thoracic paravertebral region or thoracic epidural region. The primary endpoint consisted to measure the frequency of hypotension episodes defined by a mean arterial pressure (MAP) less than 60 mmHg or a decrease in MAP greater than 20% when compared with the preoperative value. Secondary endpoints evaluated the amount of intraoperative fluid administration, the use of vasopressor drugs, the analgesic efficacy assessed by the visual analogue scale (VAS), any postoperative events such as PONV, shivering or respiratory complications.

**Results and discussion:** As compared to the PVB group the TEB group showed significant decrease in both mean blood pressure and heart rate during most of the intraoperative period. The intraoperative fluid consumption was higher in the TEB group as compared to the PVB group. In Group TEB 25% (10/40) patients required vasopressors as compared to 10% (4/40) in Group PVB. The total rescue analgesic consumption between the two groups were comparable. Postoperative VAS between the studied groups was similar. Postoperative events in both the groups were comparable.

**Conclusion(s):** Single injection PVB and TEB had similar quality of surgical anaesthesia, post-operative pain relief and patient satisfaction however PVB had better hemodynamic stability than TEB in patients undergoing breast surgeries. Further data and studies will be required to confirm this preliminary study.




*[Calibration line of the prediction model]*

**References:**

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## 02AP01-11

### External validation of a predictive model of acute postoperative pain at home after ambulatory surgery

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**Background and Goal of the Study:** A prediction model to pre-operatively detect those patients at risk for moderate to severe acute postoperative pain (APSP) after ambulatory surgery has been described 1. Before considering use and implementation of this prediction model, the generalizability of the model needs to be evaluated in a new population by external validation. Hence, the aim of our study was to externally validate this model.

**Methods:** Elective patients scheduled for day surgery were prospectively enrolled from November 2008 to April 2010. Outcome parameters were measured by using questionnaire packages at two time points: one week preoperatively and four days postoperatively. For each individual in our cohort, the predicted probability of moderate to severe APSP, defined as NRS > 4, was computed using the regression coefficients (i.e. the natural logarithm of the odds ratios) of the model presented by Gramke et al. (1). Model discrimination was tested by determining the area under the receiver operating characteristic curve (AUC). Model calibration was tested by an inspection of the calibration plot.

**Results and discussion:** A total of 1118 patients were included. Overall, the baseline characteristics of the derivation and the validation cohorts were similar. The AUC for the original model was 0.82 in the derivation dataset and 0.71 in our validation dataset. The calibration plot of this model shows a risk prediction that is too extreme, i.e. an underestimation of the predicted low risks and a distinct overestimation of the predicted high risks (Figure).

**Conclusion:** We could not externally validate the use of the prediction model of Gramke et al. (1) on our cohort of outpatients since both discrimination and calibration were less than expected.

## 02AP02-1

### A novel nasal CPAP mask assembly maintained spontaneous respiration and improved oxygenation in a morbidly obese patient with OSA, difficult airway and severe cardiopulmonary diseases under MAC during cystoscopy

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**Background:** Patients often receive IV sedation and $O_2$ via a nasal cannula (NC) during monitored anaesthesia care (MAC). Over-sedation or airway obstruction may cause severe desaturation, especially in obese patients with obstructive sleep apnea (OSA). A simple nasal CPAP mask assembly has been shown to maintain spontaneous respiration and improve oxygenation in deeply sedated OSA patients.[1-3] We report its use in a morbidly obese OSA patient with difficult airway and severe cardiopulmonary diseases during cystoscopy.

**Case report:** A 37 y/o morbidly obese male (BMI 62 kg/m$^2$) with Class IV airway, OSA, pulmonary HTN, CHF, CAD, COPD/asthma requiring home NC $O_2$ (4 L/min)presented for cystoscopy, utereroscopy and laser lithotripsy for urethral stone. Due to patient's severe cardiopulmonary diseases and physical habitus, the procedure was to proceed under MAC with difficult airway intubation equipment standby. His $O_2$ saturation (Sat) was 87% with NC 4 L $O_2$/min and would decrease with any change from sitting position.

With patient lying supine, an infant mask with fully inflated air cushion was placed over his nose and secured with head straps and connected to anaesthesia breathing circuit/machine with 12 L/min $O_2$ and 5-6 cm $H_2O$ CPAP. His $O_2$ Sat increased to 92%.

He then received midazolam (2 mg) and fentanyl (50 mcg x 2). During the following 2 ½ hour procedure, he was maintained on conscious sedation titrated with ketamine (total 80 mg), dexmedetomidine (total 139 mcg) and a propofol infusion (40 mcg/kg/min for 25 min). He also received IV acetaminophen (1 g). He maintained spontaneous respiration and his $O_2$ Sat mid 80's%. He tolerated the procedure well without any complication. He was doing well with facial CPAP in the PACU. He was elated that endotracheal intubation was avoided and gave consent for photography and case report.

After a brief period on facial CPAP, he received his routine NC $O_2$ supplement. He was discharged home without any problem.

**Discussion:** This simple nasal CPAP assembly maintained spontaneous respiration and prevented severe desaturation in a morbidly obese patient with a difficult airway, OSA and severe cardiopulmonary diseases under procedure sedation. It may improve patient safety.

**References:**
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**Learning points:** How to prepare a nasal mask assembly and how to provide CPAP in obese OSA patients and assisted nasal ventilation in deeply sedated patients with airway obstruction.

## 02AP02-2

### Comparison of propofol/ketamine and propofol/alfentanil combinations on sedation for upper gastrointestinal system endoscopy in morbidly obese patients

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**Background and Goal of Study:** Propofol sedation is the most commonly used technique for upper gastrointestinal endoscopy in morbidly obese patients (UGEMOP). Our aim with this study is to observe effects of ketamine propofol and alfentanil propofol on sedation in UGEMOP.
**Materials and methods:** 52 patients were included in the study. Subjects were divided into two groups: Alfentanil 10 $\mu$g/kg IV (Group A; n=26) and ketamine 0.5 mg/kg IV (Group K; n=26). Each patient was administered 0.7 mg/kg IV propofol for induction. If needed, patients were also administered additional dose of IV propofol. Total propofol consumption, Aldtrete scores at 5 minutes and at 10 minutes after the procedure, practitioner and patient satisfaction scores as well as side effects like bradycardia, hypotension were all recorded.
**Results and discussion:** Sedation initial time and duration were both significantly shorter in Group A (2.1±0.1 min, 3.1±0.1 min [p<0.05]; 10.9±0.9 min, 12.5±1.2 min [p<0.05] ). Time for modified Aldrete score to reach 5 was significantly longer in Group K (7.5±0.7 min, 8.3±0.7 min [p<0.05]). Total propofol consumption was significantly lower in Group A (102.8±8.8 mg, 128.6±7.4 [p<0.05]).
**Conclusion(s):** We've observed that both propofol/alfentanil and propofol/ketamine combinations provide appropriate hypnosis and analgesia at UGEMOP. However, propofol consumption was significantly more in propofol/ketamine combination.
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## 02AP02-3

### Impact of the additive ketamine or fentanyl on quality of sedation in endoscopic ultrasonography with propofol

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**Background and Goal of Study:** Application of the endoscopic procedures under anesthesia was increased according to improve patients comfort and satisfaction. Various medical combinations are used for this manner. Here in this study, we aimed to compare the quality of sedation on endoscopic ultrasonography (EUS) application with propofol- fentanyl and propofol- ketamin combination.
**Materials and methods:** Ninety patients with scheduled EUS were enrolled to study. After premedication, sedation anesthesia was performed with 1,5 mg.kg$^{-1}$ Propofol, 1 mg.kg$^{-1}$ Ketamin in Group K and 1,5 mg.kg$^{-1}$ Propofol, 1 mcg.kg$^{-1}$ Fentanil in Grup F. In the situation of inadequate anesthesia, additive 0,2 mg/kg Propofol was performed. Richmond Agitation Score (RAS), hear rate (HR), mean systolic-diastolic blood pressure, peripheral oxygen saturation ($SpO_2$), duration of procedure and used propofol doses were recorded. Nausea and vomiting, Numeric Rank Score, visual analog scale (VAS) and Aldrete score were recorded postoperatively. The satisfaction of doctor and patients were scored between 0-4.
**Results and discussion:** Total used propofol dose and PACU discharge time were significantly lower in Group F (p<0.001). Intraoperative HR and TA were more stable in Group F rather than Group K (p:0.002) however intraoperative $SpO_2$ levels were similar between groups. HR, TA at the entrance of PACU and PACU discharge time was significantly increased in Group K (p<0.001). Patients satisfaction was significantly improved in Group F (p:0.01) but no difference was found for doctor's satisfaction.
**Conclusion(s):** Propofol- Fentanyl combination is found to be more comfortable in esophageal, gastric and pancreaticobilier EUS application especially in advanced age and the presence of concomitant disease rather than propofol-ketamin combination.
**References:**
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## 02AP02-4

### Midazolam and opioids dosing strategies in gastrointestinal endoscopies - approach by response surface model

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**Background and Goal of Study:** Classical midazolam-opioid combination for gastrointestinal endoscopy sedation has been adopted for decades. Dosing regimens have been studied but mainly involves initial boluses only. We intend to use a sophisticated pharmacodynamic tool, response surface model (RSM), to simulate sedation using different regimens. RSM can predict patient's response during different phases of examination and predict patient's wake-up time with precision, which will aid physicians in guiding their dosing strategy and timing.
**Materials and methods:** The first step is to develop the full Greco RSMs. They are constructed using 33 patients who received esophagogastroduodenoscopy (EGD) and colonoscopy as a single-staged procedure using midazolam and alfentanil. The examination was divided into three phases: EGD, colonoscopy and intersession (the time lapse between procedures). Observer's Assessment of Alertness Score (OAA/S) is used to assess patient response. Step two involves simulating of six regimens with different characteristics using the RSMs: midazolam only, balanced midazolam and opioids, high dose opioids and midazolam, low dose midazolam with high dose opioids, high dose midazolam and low dose opioids, and finally midazolam with continuous opioid infusion. Loss of response at 95% probability for adequate anesthesia and return of consciousness at 50% probability was selected for simulation purposes.

**Results and discussion:** Average age of the patient population is 49.3. Mean BMI is 21.9 ± 2.3 kg/m². 56.7% were females and none received prior abdominal surgery. The cecal intubation rate was 100%. Only one patient (3%) developed temporary hypoxemia which was promptly managed with simple measures. The full Greco RSMs are developed for each of the phases and showed significant synergy between midazolam and alfentanil. The balanced midazolam and opioid combination provided adequate anesthesia and most rapid return of consciousness. The awakening time from the final bolus of medication was 7.4 min during EGD and colonoscopy stimulation, and 9.1 min during EGD simulation.
**Conclusion(s):** Simulation of regimens with different characteristics gives insights on dosing strategies. We believe with the aid of our response surface model, we can demonstrate that with the correct dosing strategies, midazolam and opioids can achieve adequate sedation and rapid recovery.

## 02AP02-5

### Effects of anesthetic drugs on otoacoustic emissions: experimental study

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**Background and Goal of Study:** Otoacoustic emission (OAEs) measurements become widely used in new-born hearing screening and audiologic evaluation (1). The aim of this study is to find out the effects of ketamine, midazolam and dexmedetomidine on OAEs in order to define the best sedative agent during OAE measurements.
**Materials and methods:** Sixteen healthy adult Wistar Albino rats included in the study following Local Animal Ethics Committee approval. All rats had undergone an otoscopic ear evaluation before experiment. Rats were divided into 3 groups, Group Ketamine (Group K, n=6), Group Midazolam (Group M, n= 5) and Group Dexmedetomidine (Group=D, n= 5,). All rats received intraperitoneal Xylazine 10mg/kg. Group K received 90mg/kg Ketamine,Group M had Midazolam 5 mg/kg and Group D was given Dexmedetomidine 50$\mu$g/kg intraperitoneally. SpO2, heart rate (HR) and noninvasive blood pressure (AP) were monitored. When adequate sedation achieved (approx. 5 min) rats were taken into the sound isolated room and distortion product otoacoustic emissions (DPOAEs) were measured at 3-12 kHz levels at each ear (Group K n=12, Group M n=10, Group D n=10)
**Results and discussion:** AP were significantly lower in Group M (MeanAP 95.8±32.7 mmHg) and Group D (MeanAP 48±4.55 mmHg) whereas Group K had a higher MeanAP (118.7±28.2 mmHg) ($p<0.05$). HR and SpO2 were similar in all groups ($p>0.05$). DPOAEs were measurable at all kHz levels in all groups, measurement of one ear in Group D was neglected while the DPOAE measurement was less than 6 dB SPL of Signal/Noise ratio ( Group D DPOAEs n=9). When comparisons between groups were performed there was a statistical difference only in 3 kHz level ($p<0.05$). There was no difference between groups at 4-12 kHz DPOAEs measurements.
**Conclusion(s):** During OAE measurements some patients may require sedation and anesthesia. In order to neglect the drug effects on measurements through systemic or direct effects best agents should be defined. Three sedative drugs used in this study have no effects on DPOAE measurements while they decrease blood presssures in rats. Ketamine, midazolam and dexmedetomidine can be used for sedation according to the experience of anesthesiologist during OAE measurements.
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## 02AP02-6

### Comparison of the efficacy of pregabalin and hydroxyzine versus placebo as premedication during the insertion of long-lasting intravenous device (LLID)

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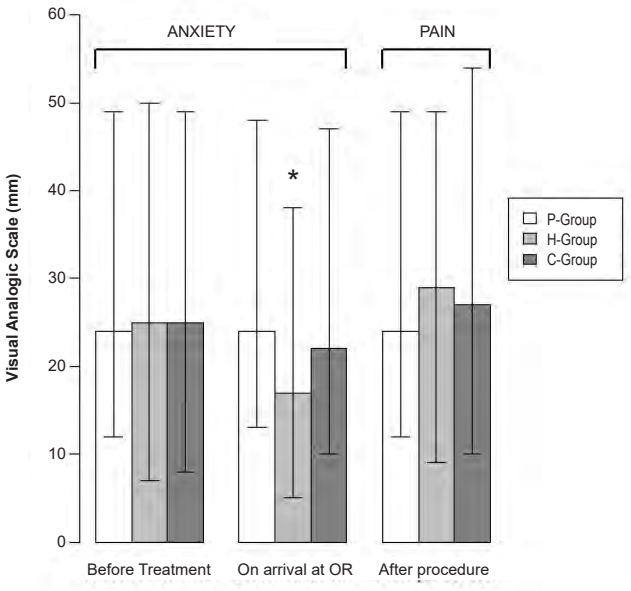
**Background and Goal of Study:** The insertion of LLID occurs in a particular emotional context. Therefore, administration of an anxiolytic drug can be questionable.
Hydroxyzine is one of the reference molecule for premedication because of its anxiolytic and sedative properties. Pregabalin is indicated for the treatment of generalized anxiety disorders and chronic pain.
The main objective of our study was to compare the efficacy of pregabalin and hydroxyzine on the anxiety score given as premedication during the insertion of LLID under local anaesthesia.
**Materials and methods:** After informed written consent, patients requiring a first insertion of LLID were randomized to receive double-blind 150 mg of pregabalin (P group) or 75 mg of hydroxyzine (H group) or placebo (C group) 2 hours before procedure.
Anxiety was evaluated with a visual analogic scale (VAS) (0 (no anxiety) to 100) just before receiving treatment and on arrival at operating room (OR). Pain was evaluated with VAS just after procedure (0 (no pain) to 100). Side effects (drowsiness, drunkenness, dizziness…) were collected on arrival at OR and 48 hours later. The use of rescue analgesic agent was noted during the first 48 hours after the procedure.
Comparisons between the 3 groups were performed with analysis of variance or nonparametric Kruskall-Wallis analysis according to distribution of data. When overall significant difference was evidenced, post-hoc 2 by 2 comparisons were made with Fisher's Least Significant Difference test.
**Results and discussion:** From May 2011 to December 2014, 300 patients were included and 294 were randomized (98 in P group, 99 in H group and 97 in C group).
Premedicated patients with hydroxyzine had significantly lower VAS-A on arrival at OR than those with pregabalin or placebo (median [interquartile]: 17.0 [5.0-38.0] vs 24.0 [13.0-48.0] or 22.0 [10.0-47.0] with p=0.041) (figure). Pain, use of rescue analgesics and side effects were not significantly different among the 3 groups.




*[Evaluation of anxiety and pain by VAS]*

**Conclusion(s):** Pregabalin is not efficient to prevent for anxiety and pain during the insertion of LLID under local anaesthesia.
**Acknowledgements:** This study was funded by Sport et Collection

## 02AP02-8

### A new developing and quantitative analysis of bowel sound after intravenous propofol anesthesia tailor evaluation of postoperative bowel motility

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**Background and Goal of Study:** In clinical settings, physicians use stethoscopes to assess bowel sounds and evaluate bowel condition. The auscultation of bowel sounds is affected by training and experience of the observers and there is no objective medical instrument can be used for quantitatively analyzing the peristalsis of intestine postoperatively.
Evaluating postoperative bowel dyskinesia is troubled by physicians and nurses. Thus, we develop a bowel sound analysis system to assist recognizing bowel motility.
**Materials and methods:** In this observational study, bowel sounds in 40 patients receiving intravenous anesthesia (propofol) under standard monitoring are recorded by the 3M Littmann electronic stethoscope model 3200. The study (CMH 10402-009) is approved by institutional review board (IRB) of Chi Mei Medical Center, Tainan, Taiwan.
In this study, sound index, intestine creep motion, frequency, duration, energy of each sound and sound to sound interval of these 40 patients' bowel sounds are processed and analyzed by the computer program.Sound index is the summation of each bowel sound amplitude in one minute and it indirectly indicates the motility of intestine. We record one period for one minute and there are five recording periods in one patient which are pre-anesthesia, 1 minute post anesthesia, post endoscopy 5, 15, and 30 minutes later in recovery room. Thus, total 200 recording data are analyzed and quantitated in the computer.
**Results and discussion:** Sound index and intestine creep motion ($p<0.001$) dramatically decline post anesthesia but boom in recovery room. The anesthetic drugs can result in silent bowel sound. However, carbon dioxide ($CO_2$) insufflation may be the chief cause of bowel hyperactivity. Sound duration, central frequency and sound to sound interval ($p<0.001$) of each bowel sound are also providing statistically notable data. With the aid of this system, we quantitatively analyze the bowel motility in time.
**Conclusion(s):** The findings of this study may be applied for clinical uses including a better guide for patients when to eat post-operatively and the early detection of the abdominal symptoms and signs. More clinical applications of bowel parameters will be further created and the method described here has potential applications in the tailored evaluation of postoperative bowel motility.

## 02AP02-9

### National audit safety of deep sedation performed by sedation practitioners

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**Background and Goal of study:** In the Netherlands, moderate-to-deep sedation is performed by specially trained sedation practitioners (SPS) under indirect supervision of an anesthesiologist. To evaluate safety of this practice a national registry of sedation related adverse events (AE) was established. Since the primary risk of sedation is airway related, we analysed all respiratory AEs from this registry.
**Materials and methods:** The prospective registry included all adult procedural sedation and analgesia cases in 20 Dutch academic and district general hospitals, from the 1st of February 2015 - 1st of December 2015. The EC stated that their approval of this study was not required. Data was collected with a modified world SIVA International Sedation Taskforce adverse event reporting tool[1] and are presented as descriptive statistics.
**Results and discussion:** The registry contains 7004 patients, 20% ASA-1; 61% ASA-2; 18% ASA-3 and 1% ASA-4, with a median age of 63 (IQR 49-71) that underwent 1617 oesophagogastrodoudenoscopies, 1050 endoscopic retrograde cholangiopancreaticographies, 1649 colonoscopies, 268 lung and 1120 cardiological interventions, 96 interventional radiology and 1400 other procedures. From the total of 974 (14%) AEs, 692 (10%) were respiratory related. There were 566 (8%) airway obstructions which needed an airway maneuver (i.e. head tilt, chin lift), 9 (0,1%) of these needed advanced airway management (i.e. intubation and mechanical ventilation). There were 409 (5,8%) desaturations which were all managed with increasing the inspired fraction of oxygen, an airway maneuver in 270 (3,9%), tactile stimulation in 33 (0,5%), a nasal pharyngeal airway or guedel in 84 (1,1%), mask ventilation in 70 (1%), CPAP in 4 and advanced airway management in 6 (0,1%) cases. A prolonged apnea occurred in 7 (0,1%) patients. Of the 24 patients that vomited, 5 (0,07%) aspirated, none of them developed severe aspiration pneumonia. No patients developed major sedation related complications or died of a sedation related AE.
**Conclusion:** PSA performed by trained SPS in several Dutch hospitals is associated with low AE and complication rates as reported in literature.[2] Ongoing evaluation of care processes is required to ensure further performance improvement.
**References:**
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2. Slagelse C. Scan J Gastroenterol 2011;46:1503-9.

## 02AP02-10

### Impact of music on anxiety among patients undergoing eye surgery under topical anaesthesia

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**Background and Goal of the Study:** Awake ophthalmologic surgery is particularly stressful for patients. Music has long been known to reduce anxiety, minimize the need for sedatives, and make patients feel more at ease. The purpose of this pilot study was to evaluate the effect of music on anxiety in outpatients undergoing elective eye surgery under topical anaesthesia.
**Materials and methods:** Sixty-two patients were prospectively and randomly assigned to hear relaxing music or no music via headphones just before surgery. Verbal analogue scales (VAS) were used to assess anxiety before and after music session. Overall postoperative patients' satisfaction was assessed using a standardized questionnaire. The proportion of patients receiving midazolam during surgery was also recorded. Comparisons were made using Chi-Square, or ANOVA, where appropriate.
**Results and discussion:** Significant differences were noted between groups in anxiety VAS after music session and anxiety was significantly reduced among the music group after listening to music. The music group received significantly less sedatives during surgery compared with the non-music group (16% vs 32%; $p=0.03$). Postoperative satisfaction was significantly higher in the music group.
**Conclusions:** Music listening may be considered as an inexpensive, non-invasive, non-pharmacologic mean to reduce anxiety for patients undergoing elective eye surgery under topical anaesthesia.

## 02AP03-1

### Comparative study of sedation regimens using etomidate and propofol under monitoring of Bispectral Index during gastroscopy

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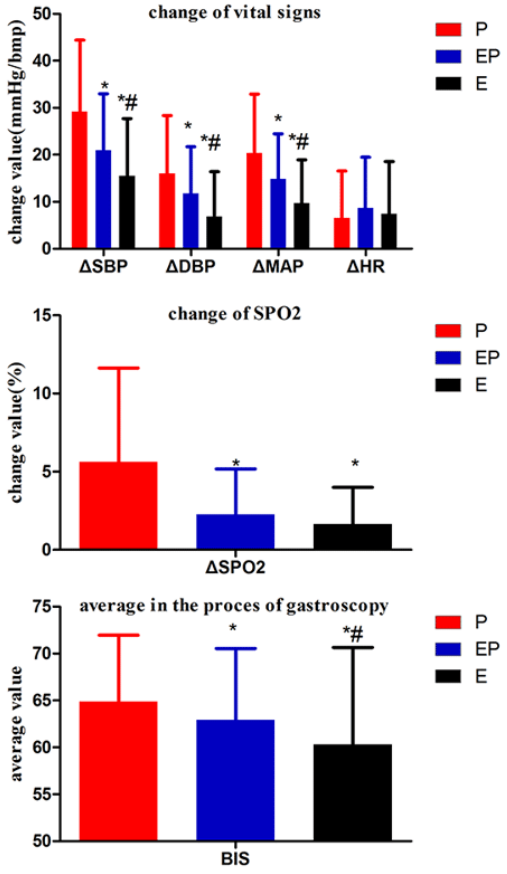
**Background and Goal of Study:** Gastroscopy ask for anesthesiologists maintain enough depth of sedation for fear of cough and agitation, but try to avoid excessive sedation which lead to respiratory and circulatory inhibition. This prospective study compared the safety, depth of sedation, recovery time, and side effects of single or combined application of etomidate and propofol sedation for patients under gastroscopy.
**Materials and methods:** Three hundred patients with ASA I-III scheduled for gastroscopy were randomized into three groups : group P (1.5 mg/kg propofol induce+0.5 mg/kg propofol maintain n=100), group EP (0.5 mg/kg propofol+0.2 mg/kg etomidate induce+0.5 mg/kg propofol maintain n=100), and group E (0.25 mg/kg etomidate induce+0.1 mg/kg etomidate maintain n=100). Vital signs including MAP (mean arterial pressure), HR (heart rate), and SpO2 (pulse oxygen saturation) were recorded as the primary outcomes. The BIS value (bispectral index), induce time, recovery time and side effects were recorded as secondary outcomes.
**Results and discussion:** The ΔMAP (The decrease value in MAP) of group E(9.70±9.2mmHg) was less than group EP(14.83±9.6 mmHg) and group P(20.41±12.5 mmHg) (E<EP<P, p<0.01). The ΔSPO2(the decrease value in SPO2) of group EP(2(1,4)%) and group E(1(0,2)%) were less than group P (2(1,9)%)(PE/E<P, p<0.01). No significant difference was observed in ΔHR(the decrease value in HR). The average BIS value in the process of gastroscopy in group E(60.30±10.4)was lower than group P(64.86±7.1) and group EP(62.92±7.6)(E<P/EP, p<0.01). Group E had a longer induction and recovery time than group P and group EP (E>P/EP, p<0.05). The incidence of adverse effects was significantly lower in group EP, compared with the other groups. It is worth mentioning that the incidence of myoclonus in group EP had no significant difference compared with group P, but was significant less than group E(PE/P<E,p<0.01).




*[Change of vital signs and BIS]*

**Conclusion(s):** The results of this study suggest sedation regimens of etomidate-propofol provieded rapid anaesthesia induction better conditions for gastroscopy: maintain hemodynamic stability, as well as less adverse effects than propofol and etomidate alone.

## 02AP03-2

### Effectiveness of transbronchial lung biopsies using crioprobe under general anaesthesia in the interventional radiology room

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**Background and Goal of the Study:** Transbronchial lung biopsy using flexible bronchoscopy (TBLB) with cryotherapy technique improves the obtaining of samples in comparison with flexible bronchoscope.
The purpose of this study was to describe the anaesthetic management of patients who underwent TBLB by a multidisciplinary team, in order to diagnose interstitial lung disease.
**Material and methods:** We selected 65 patients who underwent lung biopsy, under general anaesthesia. Following the standard patient monitoring, general anaesthesia was induced with etomidate 0.2 mg $kg^{-1}$ and succinylcholine 1 mg $kg^{-1}$, and was maintained using propofol TCI and remifentanil 0.1-0.05 mg $kg^{-1}$ $min^{-1}$. The intubation was performed with a large diameter tube coupled to a Multiport Arndt Airway Adapter COOK Medical™ allowing the bronchoscope handling. Endotracheal intubation was accomplished with the application of topical anaesthetic directly onto the oropharyngeal, laryngeal and tracheal mucosa. The cryoprobe was introduced through the bronchoscope work channel to remove frozen lung samples under fluoroscopic control. Once the sample was obtained, the Radiologist inflated an occlusion balloon for at least three minutes to stem the bleeding and prevent possible contamination. Subsequently, absence of pulmonary bleeding was confirmed by direct visualization through the bronchoscope. Then, patients stayed at least two hours in the PACU room, and later were discharged and sent home.
**Results and discussion:** There were 65 patients with a mean age of 65 years (33-82 years), mostly male (78%). Of the group, 55% were ASA III and 35% were ASA IV. In 55% of cases 4 samples were obtained. The diagnostic yield was 89% of the samples obtained. Regarding complications, only 5% of the cases suffer from moderate bleeding. No episodes of severe bleeding or pneumothorax were reported. 30% of patients required vasopressors during induction. No patient experienced lower saturations to their baseline during surgery. No patient had episodes of bronchoconstriction or laryngospasm.
**Conclusions:** The use of a multiport connector allows different specialists to work together.Instillation into the bronchial tree with local anesthetic minimizes anesthetic requirements, ensures hemodynamic stability and explains the absence of pain and/or broncho-laryngospasm. The use of an occlusion balloon helps to control bleeding, and the possible blood spreading throughout the lung.

## 02AP03-3

### Endoscopic retrograde cholangiopancreatography and sedoanalgesia

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**Background:** ERCP;performed for treatment of biliary tractus,pancreatic duct and periampullary diseases is a painful and irritating procedure. So, it is necessary to facilitate endoscopy studies under sedation. For this purpose; remifentanil, propofol or dexmedetomidine infusions with benzodiazepine and narcotics are generally used. In our study, it was aimed to compare the usage of remifentanil, dexmedetomidine and propofol as sedoanalgesia according to demographic characteristics, concomitant diseases, ASA, operation time, additional narcotic and hypnotic dosage.
**Materials:** The study included patients aged>18years in whomERCPwas indicated under sedoanalgesia. The study was approved by Institutional Ethics Committee. All patients gave written informed consent before participation. Analgesic agents were given10minutes beforeERCP to provide sedation of 50-70 BISlevel. The study was designed with 4 groups. G1(n=44, 14.6%): 0.025-0.05mcg.kg-1.min-1remifentanylIV. G2 (n=48,15.6%): 0.30.6mcg.kg1.

h1dexmedetomidine- IV. G3 (n=125,41.4%): 1-3 mg.kg-1propofol-IV. G4 (n=85,28.1%):0.5-1mg .kg-1propofol-IVbolus. Demographic characteristics, BMI, CCI, concomitant diseases, ASA, operation time, additional narcotic and hypnotic dosage and smoking were recorded (Table1).

**Results:** The study conducted on 302 patient (54% females- 46% males and mean age of 60.66±16.72). There was significant difference in the additional propofol use between groups (p=0.001; p<0.01) and in the additional midazolam use between groups (p=0.034; p<0.05). In binary comparison to identify source of difference, it was found that additional propofol use were significantly higher in group 2 (100 %)than group 3 (84.8%) (p=0.009; p<0.01) and additional dormicum use were significantly higher in group 2 (66.7%) than group1 (38.6%) and group 3 (45.6%) (p1=0.013; p2=0.021; p<0.05) and additional dormicum use were significantly higher in group 4 (51.8 %) than group 3 (45.6%).

**Conclusion:** ERCPis a process applied to high-risk patients with comorbidities. In our study, propofol infusion was found to be optimal during ERCP. And the dexmetodimidine was insufficient. More large studies are needed to find the most suitable drug and suitable dose.

**Table 1: Demographic features and general data regarding to groups**

| | | Min-Max | Mean±SD | |
|---|---|---|---|---|
| Age | | 22-90 | 60,66±16,72 | |
| BMI (kg/m²) | | 15,03-46,07 | 28,21±5,29 | |
| Operation Time (min) | | 10-180 | 41,9±24,07 | |
| Charlson Index | | 1-6 | 2,56±1,34 | |
| Propofol (mg) | | 10-460 | 101,92±73,94 | |
| Fentanyl (mcg) | | 25-80 | 54,9±13,11 | |
| Dormicum (mg) | | 1-4 | 1,71±0,63 | |
| | | n | % | |
| Gender | Female | 163 | 54 | |
| | Male | 139 | 46 | |
| ASA | 1 | 62 | 20,5 | |
| | 2 | 157 | 52 | |
| | 3 | 78 | 25,8 | |
| | 4 | 5 | 1,7 | |
| Additional Drugs | Propofol | 279 | 92,4 | |
| | Fentanyl | 50 | 16,6 | |
| | Dormicum | 150 | 49,7 | |
| Diabetes Mellitus | | 56 | 18,5 | |
| Thyroid Disorder | | 30 | 9,9 | |
| HT/CAD/CHF | | 145 | 48 | |
| COPD/Astma | | 41 | 13,6 | |
| ARF/CRF | | 30 | 9,9 | |
| Neurologic Disorder | | 16 | 5,3 | |
| Smoking | | 92 | 30,5 | |
| | Group 1 (n=44) | Group 2 (n=48) | Group 3 (n=125) | Group 4 (n=85) | p |
| Age Mean±SD | 63,68±15,13 | 56,98±16,32 | 62,27±17,09 | 58,79±16,86 | [3]0,112 |
| Female n(%) | 24 (%54,5) | 29 (%60,4) | 69 (%55,2) | 41 (%48,2) | [2]0,570 |
| Male n(%) | 20 (%45,5) | 19 (%39,6) | 56 (%44,8) | 44 (%51,8) | |
| Propofol n(%) | 41 (%93,2) | 48 (%100) | 106 (%84,8) | 84 (%98,8) | [2]0,001** |
| Fentanyl n(%) | 10 (%22,7) | 7 (%14,6) | 16 (%12,8) | 17 (%20) | [2]0,340 |
| Dormicum n(%) | 17 (%38,6) | 32 (%66,7) | 57 (%45,6) | 44 (%51,8) | [2]0,034* |

[1]One Way ANOVA Test [2]Chi-Square Test [3]Kruskall Wallis Test *p<0.05

*[Figure]*

## 02AP03-4

### Tension pneumothorax after arthroscopic shoulder stabilization: a case report

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**Background:** Outpatient shoulder arthroscopy is a common procedure, with low complication rates, performed under regional or combined general anesthesia (GA) and interscalene nerve block (ISB).

**Case report:** We present a case of tension pneumothorax in a male young patient, non smoker and without any pulmonary disease. He underwent arthroscopic shoulder stabilization with general anesthesia and previous (30 minutes before induction of GA) ultrasound-guided (USG) ISB with 10 ml of levobupivacaine 0,25%, using in-plane approach without any complications. Once intubated, we checked symmetrical pulmonary auscultation. Surgery was carried out in the lateral decubitus position using standard arthroscopic portals without technical difficulties. During 100 minutes of surgery vital signs remained stable. Before extubation recruitment maneuvers were performed, and the patient was transferred to the ambulatory unit. 3 hours later, the doctor on duty surprisingly received a phone call from the radiologist informing of the presence of tension pneumothorax. The surgeon, who had suspected pleural injury during trocar placement, had made the application of chest X-ray, without notifying it to the anesthesiologist. Fortunately, the patient hadn't been discharged. He was hemodynamically stable, oxygen saturation around 96-97% and left lung hipophonesis. Patient refered only mild chest pain on inspiration without dyspnea associated. Chest tube drainage was placed and patient was discharged from hospital after 7 days.

**Discussion:** USG-ISB is commonly used for outpatient arthroscopic shoulder procedures. Althought ultrasound guidance has decreased significantly the incidence of pneumothorax, anesthesiologist must be aware of this complication because it can occur as a result of direct lung injury during USG-ISB performance or during trocar placement. Surgeons must report suspected pleural injury because mechanical ventilation and recruitment maneuvers may worsen pneumotorax. Therefore, in a healthy young patient, tension pneumothorax can cause limited symptoms and the patient could have been discharged without the diagnosis of a life-threatening complication.

**Learning points:** Orthopedic surgeons and anesthesiologist must be alert for pneumothorax recognition during perioperative period after shoulder arthroscopic surgery for early diagnosis and treatment.

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1. R Li et al. Ann J Orthop 2015; 44(10): E407-10.
2. Mandim BL et al. Rev Bras Anestesiol 2012;62(5):74-7.

## 02AP03-5

### Hemodynamic repercussion of different loading dose of Dexdor® for oral and maxillofacial ambulatory surgery: and observational study

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**Background:** A loading dose of Dexdor® may contribute to achieve early an optimum level of sedation, which is essential to perform ambulatory procedures. But it can produces moderate hemodynamic repercussion (bradycardia and hypertension). Our objective was to evaluate the effect of several loading dose of Dexdor® on hemodynamic repercussion.

**Material and methods:** Observational study approved by IRB for patients underwent Oral and Maxillofacial Ambulatory Surgery at University of Navarra Clinic from February 2013 to November 2014. The patients were grouped into three categories according to the loading dose: <0.5, 0.5, and >0.5 $\mu g \cdot kg^{-1}$. We employed an ANOVA to analyze differences in heart rate, systolic and diastolic blood pressure on arrive, at the end of the loading dose (10 min), beginning of the procedure (20 min) and 30 and 60 min. The clinical repercussion of the loading dose was analyzed from vasoactive drugs requirements (atropine for bradycardia and urapidilo for hypertension) using odds ratio.

**Results and discussion:** A total of 111 patients were analyzed: 25 in the <0.5 $\mu g \cdot kg^{-1}$ group; 69 in the 0.5 $\mu g \cdot kg^{-1}$; and 17 in the >0.5 $\mu g \cdot kg^{-1}$. No statistical different was observed in data at baseline. We did not found a statistically association between the different groups of loading dose and the heart rate and diastolic blood pressure. Mean systolic blood pressure showed a statistically association in function of the group of loading dose of Dexdor® in all the periods study (<0.5 vs 0.5 vs >0.5 $\mu g \cdot kg^{-1}$): at 10 min 121.7 (± 4.9) vs 120.3 (± 2.7) vs 134.7 (± 8.8) ($p$ = 0.02); at 20 min 113.7 (± 4.4) vs 111.5 (± 2.3) vs 122.1 (± 4.9) ($p$ = 0.05); at 30 min 110.3 (± 4.3) vs 107.8 (± 2.2) vs 122.5 (± 5.3) ($p$ = 0.01);
at 60 min 105.1 (± 4) vs 106.4 (± 1.8) vs 117.4 (± 5) ($p$ = 0.03). But this association was not clinically significant: none required urapidil. Only 5 patients required atropine. Patients in the groups >0.5 $\mu g \cdot kg^{-1}$ had a probability of 3.2 (95% CI: 0.26, 38.42) of required atropine compared with the group <0.5 $\mu g \cdot kg^{-1}$.

**Conclusion:** Administer a loading dose of Dexdor® could be essential to achieve and maintain an optimal level of sedation for ambulatory procedures. Although the mean systolic blood pressure showed a statistically association with the loading dose group, we did not observed a clinical repercussion. Patients in loading dose group >0.5 $\mu g \cdot kg^{-1}$ showed higher probability of received atropine, no other adverse effects were observed.

## 02AP03-6

### Plain chloroprocaine 1% for low dose spinal anaesthesia in minor, outpatient perianal surgery

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**Background and Goal of Study:** Low-dose spinal anaesthesia (SPA) is a safe and reliable anaesthesia technique in outpatient perianal surgery. Plain chloroprocaine 1% (CP) is the only short-acting local anaesthetic admitted for intrathecal injection in Germany. Regarding the slightly hyperbaric effect and its duration of action, plain CP seems to be ideal to perform low-dose SPA for perianal procedures.
The aim of this trial was to determine the optimal dosage of plain CP 1% in patients undergoing perianal outpatient surgery.
**Materials and methods:** All patients (male / female, ASA-status I-III, age: 18-80 years) undergoing perianal surgery were eligible for this prospective, randomised, clinical trial. Exclusion criteria were contraindications to SPA and allergies against drugs used. After ethics committee approval 120 patients were enrolled to the study. They were randomised 1:1:1 to receive either 10, 20 or 30mg of CP intrathecally. Patients had to remain seated in an upright position for at least 10 min after injection. We measured the expansion of sensory and motor block and the times until discharge. Statistical analysis was performed using the Kruskal-Wallis-, $Chi^2$-, Tukey- or Fisher's Exact-Test as indicated.
**Results and discussion:** No significant differences regarding demographic data could be detected between the groups. We found a positive correlation of the applied dose and the expansion of the sensory ($p<0,0005$) as well as the motor block ($p<0,0086$), while a significant motor block occurred only at a dosage of 30mg (Tab. 1). Doses of 10mg and 20mg led to a significant earlier discharge compared to 30mg ($p=0,0003$ vs. $p=0,0406$, Tab. 1). Two SPA failed after assumed successful injection (10mg and 30mg, n=1 each). Seven patients in the 10mg group suffered from pain (n=2) due to an incomplete block or discomfort (intestinal pressure, contact with surgeons hand) during the procedure, eased with additional local anaesthesia or sedation.
**Conclusion:** Plain CP 1% can safely be used for low dose SPA in perianal outpatient surgery. Regarding the avoidable motor block and later discharge-times in the 30mg group as well as the block-failures in the 10 mg group, 20mg can be recommended as the nearly "optimal" dose.

| Dose | 10mg | 20mg | 30mg |
|---|---|---|---|
| Sensory block (number of anaesthetized dermatomes, median (range)) | 3.5 (0-9) | 5 (2-13) | 7 (0-12) |
| Motor block (modified Bromage Score, median (range)) | 0 (0-1) | 0 (0-3) | 1.5 (0-3) |
| Time until discharge (min from intrathecal injection, mean ± standard deviation) | 106.1 ±33.1 | 117.3 ±26.4 | 134.4 ±33.4 |

*[Table 1]*

## 02AP03-7

### Regional anesthesia: tailored for outpatient surgery?

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**Background and Goal of Study:** Outpatient surgery is growing. Type of surgery indicated for outpatient regimen are broadening as well as anesthesia techniques. However, the use of regional anesthesia as a first choice in outpatient units is still questionable. Concerns about undetected post discharge complications in patients without immediate access to differentiated treatments highlight the importance for careful scrutiny about the usage of this techniques.
With this 3 year retrospective observational study we pretend to evaluate the incidence of regional anesthesia complications post outpatient unit discharge as well as level of pain control and patient satisfaction.
**Materials and methods:** A total of 839 follow-up questionnaires of all patients undergoing regional anesthesia from October 2011 to October 2014, in our outpatient unit were analysed. Demographic data, number and type of complications, pain intensity at 24 h, unintended hospitalizations and patient satisfaction were evaluated.
**Results and discussion:** Of the 839 (823 spinal and 16 braquial plexus block) patients submitted to regional anesthesia, 134 (15.97%) had a complication. Complications identified were post-dural puncture headache (PDPH), dizziness, postoperative nausea and vomiting (PONV) and back pain. Residual motor block was not reported.
The most frequent one was PDPH, with 61 cases identified (7,27%) in all subarachnoid block performed but only one case of PDPH needed hospitalization for treatment of persisting symptoms. The second most frequent complication was PONV with a total of 28 reports.
Pain intensity (EN) was less than 4 in 659 patients (78.5%) and 696 (82.96%) patients presented satisfaction levels between Good and Very Good.
**Conclusion(s):** These results associated with the ecoguided nerve peripherical blocks and low dosage local anesthetics reinforces regional anesthesia as safe technique. However the occurrence of some complications due to spinal block points to the necessary investment on peripherical blocks.

## 02AP03-8

### Sedation using etomidate before propofol during colonoscopy provide circulation stabilization: a prospective randomized study

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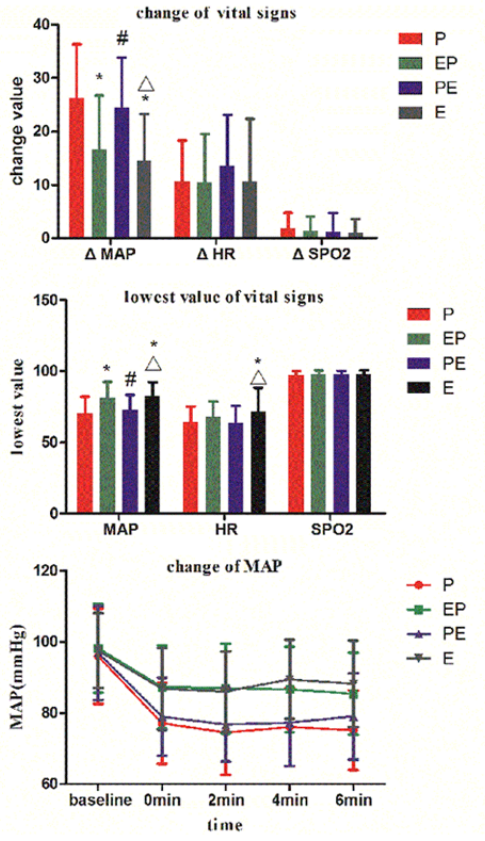
**Background and Goal of Study:** An association between triple low, the combination of low MAC (minimum alveolar concentration), low MAP (mean arterial pressure), and low BIS (bispectral index), and postoperative mortality has been reported. However, the hypotension induced by propofol, during endoscopy, is common but easily neglected.
This prospective study compared the safety, recovery time, and side effects of single or combined application of etomidate and propofol sedation for patients under colonoscopy.
**Materials and methods:** Two hundred eighty patients with ASA I-III scheduled for colonoscopy were randomized into four groups (n=70): group P (1 mg/kg propofol induce+0.5 mg/kg propofol maintain), group EP (0.2 mg/kg etomidate+0.5 mg/kg propofol maintain), group PE (1 mg/kg propofol induce+0.1 mg/kg etomidate maintain) and group E (0.2 mg/kg etomidate induce+0.1 mg/kg etomidate maintain). Hemodynamic parameters including SBP (systolic blood pressure), DBP (diastolic blood pressure), MAP (mean arterial pressure), and HR (heart rate) were recorded as the primary outcomes. The respiration parameters including SpO2 (pulse oxygen saturation) and airway obstruction occurrence rate, induce time, recovery time and side effects were recorded as secondary outcomes.
**Results and discussion:** ΔMAP (the decrease value in MAP) of group EP (16.7±10.1 mmHg) and group E(14.5±8.7 mmHg) was less than group P(26.2±10.1 mmHg) and group PE(24.4±9.4 mmHg)($p<0.05$). No significant difference was observed in ΔHR (the decrease value in HR), ΔSPO2 (the decrease value in SPO2) among the four groups, but the number of airway obstruction occurs in group P was more than other three groups. Group EP(61.3±19.5s) and group E(60.1±20.3s) had a shorter induction time than group P(70.3±25.9s) and group PE(72.2±29.8s). The incidence of adverse effects were significantly lower in group EP, compared with the other three groups.




*[Change of vital signs]*

**Conclusion(s):** The results of this study suggest anaesthetic regimens of etomidate-induce and propofol-maintain provieded rapid anaesthesia induction better conditions for colonoscopy: maintain hemodynamic stability, as well as less adverse effects than propofol-induce and etomidate alone.

## 02AP03-9

### Differential pattern in the use of antiemetic drugs in patients undergoing ambulatory surgery vs. patients hospitalized. Study in a university hospital

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**Background and Goal of Study:** Postoperative nausea and vomiting (PONV) remain a major concern in patients undergoing general anesthesia. There are three antiemetic drugs used in the prophylaxis of PONV, the practice of TIVA also be effective. Current consensus guidelines published in our country, recommend how to use antiemetic drugs in prophylaxis and in treatment of PONV. We aimed to compare the pattern of use of antiemetic drugs in ambulatory (AS-group) vs. hospitalized patients (H-group) undergoing surgery with general anesthesia.
**Materials and methods:** A retrospective, comparative cohort study was performed in adult patients operated on AS or on H under general anesthesia. Apfel risk of PONV, demographics, anesthesia and surgery relevant data were recorded. Antiemetic drugs, TIVA practice and the prophylaxis and treatment agents used were compared between the two groups.
**Results and discussion:** 228 patients were evaluated (114 patients in each group), ASA I-III. The mean age in AS group was 44±16 years, and in H group was 57±17, p= 0.0001. There were no differences between the two groups in mean Apfel risk factors, being 1.6 ± 0.9 in the AS-group and 1.7 ± 0.9 in the H-group, p = 0.29. The percentage of patients in whom prophylaxis was lower than recommended was 8% in the AS-group and 46% in the H-group, p = 0.0001. Drugs used in the prophylaxis were: ondansetron 4% in AS-group vs. 32%% in H-group, p = 0.0001; dexamethasone 85% in AS-group vs. 51%% in H-group, p = 0.0001; droperidol 64%% in AS-group vs. 18%% in H-group, p = 0.0001. There were no differences in patients that received TIVA anesthesia between the two groups: 46% in AS-group vs. 42% in H-group, p = 0.54. The incidence of emetic events during the first 24 h was 5% in the AS-group and 17% in the H-group, p = 0.002.
In patients with emetic events there were no differences with the rescue antiemetic agent used. There were no differences in emetics events at 48 and 72 h after surgery between groups.
**Conclusion(s):** The results shows that the pattern of use of antiemetic drugs in AS fits more adequately to the actual recommendations, that suggest the use of dexamethasone and droperidol in antiemetic prophylaxis and reserve ondansetron to treat postoperative emetics events.
**Reference:**
Tong J, et al.Consensus Guidelines for the Management of Postoperative Nausea and Vomiting.setting. Anesth Analg 2014;118:85-113.

## 02AP03-10

### Comparison of sevoflurane with propofol/remifentanil sedation in ambulatoy colonoscopy

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**Background and Goal of Study:** Studies that evalue sedation with sevoflurane (Sv) are usually focus on the neurological recovery of patients, thus ignoring other important aspects of the procedure.
The main objective was to compare the quality of intravenous sedation using propofol and remifentanil (P/R) with an inhalation technique using Sv. We also compared the ability to complete the exploration, cardiorespiratory complications, patient movements as well as degree of early patient recovery.
**Materials and methods:** After approval of our ethics committee, a randomized, double-blinded, single-center clinical trial was performed (n= 278).
Patients were randomized to receive intravenous sedation with P/R or inhalation sedation with Sv. Depth of sedation, exploration time, the presence of cardiorespiratory complications, need for maneuvers to assist the airway and the presence of patient movements were recorded. After the procedure the degree of recovery at an early stage, and sedation assessed by the endoscopist and the patient were recorded.
Statistics: data are presented as a mean ± SD. Wilcoxon's test and Fisher's exact test were used to determine differences between P/R group and Sv group.
**Results and discussion:** Both groups were comparable with respect to the quality of sedation assessed by the endoscopist using visual analogue scale (VAS 95.4 +/- 7.9 in the Sv group versus VAS 95.3 + /- 7.9 in the P/R group). Rate of completion of the procedure and time spent on exploration were similar for both groups. Excessive sedation and the presence of movements that could hinder the advancement of the endoscope were more frequent in the Sv group. Respiratory apnea was significantly more frequent in the P/R group, while there was a greater need for mandibular subluxation in the Sv group. No differences in any of the variables making up the rating scale recovery at 30 minutes (vital signs, ambulation, pain, nausea or bleeding) were obtained. No differences in the assessment of sedation by the patient at 30 minutes and the degree of patient satisfaction were obtained.
**Conclusion(s):** Inhalation anesthesia with Sv provides working conditions comparable to those obtained using conventional intravenous sedation, allowing completion of the procedure with a similar rate of complications and a similar degree of satisfaction for the endoscopist as well as the patient.

# Regional Anaesthesiology

## 03AP01-1

### Spinal haematoma - a rare complication of epidural catheterization

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**Background:** Spinal haematoma (SH) is a rare but potentially catastrophic complication of neuraxial anaesthesia(NA). The authors present a case of a patient who developed a SH after combined spinal-epidural anaesthesia.
**Case report:** 85 yr, woman, ASA physical status II, scheduled for femoropopliteal bypass. The patient was not medicated with anti-platelet drugs and coagulation panel was normal. After standard ASA monitoring, ST segment analysis and invasive blood pressure monitoring, the patient underwent combined spinal-epidural anaesthesia by an experienced anaesthesiologist at L4-L5 space, first attempt, using a 27G spinal needle and a18G epidural needle. 40 minutes after NA, 5000 U of heparin were administered. Intraoperative and postoperative period were uneventful.
At 2nd postoperativeday, patient complained of low back pain with epidural injection of local anesthetic which was immediately suspended. After 3h45m motor and sensitive block of right leg ensued, followed by contralateral limb block. Immediate MRI was undertaken: "*postero lateral epidural collection extending from D10 to D12 on the right and another from D12 to L2 on the left...narrowed lumbar canal*"**.** An emergent decompressive laminectomy was performed, 5h51m after the first symptom, without complications with total recovery of motor strength, bilaterally.
**Discussion:** The incidence of SE as a result of NA is unknown. Among the known risk factors our patient presented advanced age, narrowed lumbar canal and administration of heparin during the procedure. Prognosis is mainly dependent of the severity of symptoms and the time elapsed between the appearance of symptoms and surgical treatment, and spinal cord ischaemia tended to be reversible in patients who underwent laminectomy within 8h-12h of neurological dysfunction.
**Reference:**
1. doi:10.1093/bja/aeu461,2015; 2-doi:10.1093/bja/aen170.
**Learning points:** Despite its rarity, the awareness of this complication must be present in all patients who undergo NA approach. Immediate MRI should be considered at a low threshold when a new neurologic dysfunction arises. Prompt identification and intervention may contribute to a successful neurological outcome.

## 03AP01-2

### Amyotrophic lateral sclerosis exacerbated after spinal anesthesia

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**Background:** Patients with amyotrophic lateral sclerosis (ALS) are prone to respiratory complications. In ALS, progressive degeneration of both upper and lower motor neurons affects all major respiratory muscle groups. General anesthesia may cause ventilatory depression due to a sensitive response to muscle relaxants. Spinal and epidural anesthesia may exacerbate pre-existing neurologic disease due to the potential neurotoxic effects of local anesthetics. We present a case of a previously asymptomatic patient whose ALS is diagnosed after spinal anesthesia for elective surgery.
**Case report:** A 73-year-old man with history of degenerative osteoarticular disease was proposed for elective total hip arthroplasty. Relevant preoperative findings included hyperuricemia, hearing loss, glaucoma and dyslipidemia. He was previously autonomous in all daily life activities. Surgery was performed under subarachnoid spinal block. Both intra-operative and immediate post-operative periods were uneventful. Functional recovery program was successfully started two days after surgery.
On postoperative day five patient was found obtunded, dyspneic and with polypnea. Despite supplemental oxygen administration, progressive clinical worsening was noted with evolution to severe respiratory acidosis. The patient was intubated and transferred to the Intensive Care Unit (ICU). Full neurologic recovery and acidemia correction were obtained through mechanical ventilation and extubation was possible six days after ICU admission. However, due to recurrent hypoventilation episodes with associated respiratory acidosis and despite non-invasive ventilation attempts, patient was reintubated. Electromyography revealed multiple signs of motor neuron denervation in the cervical, dorsal and lumbar myotomes. Elective tracheostomy was performed and the patient was discharged from the ICU to the ward with positive-pressure ventilation support.
**Discussion:** Regional anesthesia has been widely used for patients with ALS as a mean of avoiding ventilator associated complications and muscle relaxant administration. Nonetheless, recent concerns regarding neurologic sequelae after spinal anesthesia become even more relevant in cases of pre-existing neurologic damage and demyelination. In this particular case, ALS was severely exacerbated after spinal anesthesia; this favours the use of alternative approaches such as general anesthesia avoiding muscle relaxant administration or epidural anesthesia.

## 03AP01-3

### Infectious complication following neuraxial technique - and now?

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**Background:** The reported cases of neuraxial technique complications have increased. However serious central neuraxial infections (osteomyelitis, meningitis, abscess) are extremely rare.
**Case report:** 63YO man, ASA2 (arterial hypertension, smoking, overweight), presented in postoperative orthopedic consultation, with back pain. Ten days before, total knee replacement under combined epidural-spinal technique. Patient's postoperative course was uneventful (epidural catheter removed at postoperative day 3). Discharge at day 5 asymptomatic. Two days after began to feel back pain at technique site. At orthopedic consultation, physical examination showed redness and swelling at punction site. Intense pain on palpation; no sensory/motor abnormalities, fever or meningismus.
Patient was hospitalized. Analytical study: elevated CRP without leukocytosis; blood cultures performed; lumbar magnetic resonance imaging (MRI) scan revealed subcutaneous tissue oedema, focal thickening at L1-L2, extending deep over the interlaminar/interspinous spaces to the epidural space (epidural catheter path), vertebral osteomyelitis at spinous apophysis of L1, without spinal/epidural abscess. Analgesia and broad-spectrum empirical intravenous antibiotics were initiated. Clinical and analytical improvement. At day 4, the blood cultures showed Methicillin sensitive staphylococcus aureus and antimicrobial therapy was replaced. Two weeks after antibiotic treatment, lumbar MRI scan revealed persistence of spondylodiscitis signs.
The patient was discharged two weeks later, asymptomatic, with infection markers declination and no changes in the MRI. He completed 30 days of antibiotic treatment (flucloxacillin+levofloxacin). 1 month follow-up: superimposable clinical condition. MRI scheduled 3 months later.
**Discussion:** Vertebral osteomyelitis is a rare but serious complication of neuraxial technique. The aim of the case report is to highlight the importance of immediate recognition and management of infectious complications after neuraxial techniques.
**Reference:**
Demeraran Y et all. Turkish Neurosurgery 2006; 16(4):208-211Fernades C et all. Rev Bras Anestesiol 2011; 61(5): 668-694
**Learning points:** Clinical presentation of vertebral osteomyelitis may not be specific. Back pain is the major clinical sign. When present, the diagnosis of vertebral osteomyelitis should be suspected and management initiated earlier.

tests. The chi-square test was used for incidence analysis, and statistical associations were determined using Pearson correlation analysis.
**Results and discussion:** The average patient age was 31.7 years old. The average procedure lasted 45.94 minutes. No drains and no tied compression garmerts were used on the breast. Nausea and emesis occurred with an overall frequency of 4.9% and 2.8% respectively. The 95.1% of the patient didn't complaint having nausea on the day of surgery, and only 3(1.2%) had this feeling remained on the fifth post op day. Only 7 patients(2.8%) had emesis on the day of the operation and after the third day no emesis was reported. No significant difference in nausea and emesis between smokers and no smokers was observed(p= 0.510, p=0.985). Only 23.1% felt moderate pain on the day of the surgery.
**Conclusion(s):** The results of this study indicate that the specific antiemetic protocol combined with a quick and painless surgical technique was highly effective in reducing the incidence of PONV in breast augmentation surgeries. The fact that we observed no difference between smokers and nonsmokers regarding the incidence of PONV should be further studied since till now all studies suggest a protective role for smoking.

## 01AP14-6
### Incidence and risk factors of PONV in ENT surgery

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**Background and Goal of Study:** Postoperative nausea and vomiting (PONV) is a common adverse event that generates additional problems to the patient and increases hospital costs. Their frequency varies widely according to the literature, being even higher in ENT surgery. There are some predictors of risk that determine the need of prophylactic drugs. Goal: To measure the incidence of PONV with dexamethasone used as prophylaxis, and seek relationship with yet known risk factors (demographic, surgery-related, and anesthesia-related).
**Materials and methods:** Observational descriptive study of 128 patients undergoing ENT surgery in Clínico San Carlos Hospital, Madrid. Routine clinical practice of the center was followed and all relevant data were collected.
**Results and discussion:** PONV incidence of 3.1% was obtained, and also a statistically significant relationship with induction dose of propofol (protective factor, p = 0.021), total dose of propofol used (protective, p = 0.04) and dexamethasone dose (protective, p = 0.03). The relationship with the classical risk factors (patient-related, surgery-related, and other drugs) was not significant. The low incidence of PONV prevented us to obtain statistically significant association with many of the studied variables; their confidence intervals were on the borderline. Therefore a larger sample would be necessary, because the sample size was originally calculated in relation to a bigger incidence obtained from the literature review.
**Conclusion(s):** The observed incidence of PONV is lower than the one described in the literature. Prophylaxis with dexamethasone and TIVA is effective in reducing the incidence of PONV. More studies linking the incidence of PONV with each of the variables studied are required.

## 01AP14-7
### Individual risk factors for postoperative nausea and vomiting

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**Background and Goal of Study:** Knowledge of postoperative nausea and vomiting (PONV) risk factors allows anesthesiologists to optimize the use of prophylactic regimens. The purpose of this study was to highlight the role of the patient for the same type of surgery, in the incidence of postoperatore nausea and vomiting.
**Materials and methods:** 184 adult (>18 years old) patients undergoing the same surgical procedures under general anaesthesia under standardised general anaesthesia (Tiopental, Sevoflurane ,O(2), fentanyl, Pancuronium, postoperative opioid analgesia). Prospective, observational study. Severe obesity (weight > 120 kg or body mass index > 35 kg/m) was an exclusion criterion.No intravenous anaesthesia or any antiemetic prophylaxis was applied. For 24 hours postoperatively, the patients were followed up for the occurrence of nausea, retching, and vomiting. Perioperatively, risk factors for POV were recorded (gender, age, smoking habits, history of previous PONV or motion sickness, duration of anaesthesia). Visual Analogue Scale (VAS) was used in the evaluation of nausea. Nausea and vomiting were assessed every two hours within the first postoperative 12 hours and every 4 hours for the next 24 hours.
**Results and discussion:** Nausea itself occurred in 22.8% of patients; whereas vomiting in 12%. Both symptoms occurred in 14.2% of patients. Nausea occurred 4.1 +/- 0.6 hours after operation; whereas vomiting after 5.2 +/- 1.1 hours. Women suffered more often than men from (R = 0.678 p <0.001). The same was registered for non-smokers (nausea: R = 0.623, vomiting: R = 0.437), and for the patients suffering from PONV earlier (R = 0.421 for nausea, and R=0.331 for vomiting). PONV also occurred more often in cases of obese patients (p <0.002) and the patients anesthetized by younger anesthetists (p <0.002). Table1.PONV,Sex,smokers.
**Conclusion(s):** Our results support the hypothesis, that individual risk factors rather than the type of surgery or anaesthetic management have a major impact on the occurrence of POV and PONV.

| | Sex | Smokers | Nonsmokers |
|---|---|---|---|
| PONV | Female | 10 | 18 |
| | Male | 10 | 8 |
| Without PONV | Female | 16 | 40 |
| | Male | 26 | 66 |

*[PONV]*

## 01AP14-8
### The additive interaction between ondansetron and dexamethasone for preventing postoperative nausea and vomiting in gynecologic surgery

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**Background and Goal of Study:** It has been demonstrated that combination of ondansetron and dexamethasone is more effective in preventing postoperative nausea and vomiting (PONV) than ondansetron or dexamethasone alone. [1,2] Assuming ondansetron and dexamethasone act independently, the combination of these two drugs produce additive effect.[3] The aim of this study was to compare the efficacy of combination of ondansetron and dexamethasone with each drug alone or placebo, and determine the pharmacologic interaction between ondansetron and dexamethasone.
**Materials and methods:** In this prospective, randomized, double-blinded, placebo-controlled study, 277 healthy patients, who underwent gynecologic surgery under general anesthesia using sevoflurane, were investigated. Patients were randomly assigned to receive:
1) saline as placebo,
2) ondansetron 8 mg,
3) dexamethasone 10 mg, or
4) combination of ondansetron 8 mg and dexamethasone 10 mg intravenously. Postoperative pain was controlled with *iv*-PCA using fentanyl. The incidence and severity of PONV, and rescue antiemetic requirement during the first 24 h after surgery were evaluated
**Results and discussion:** The incidence and severity of PONV, and rescue antiemetic requirement were significantly decreased in the all drug treatment groups compared with placebo group during the first 24 h after surgery (P <0.001). During the first 24h after surgery the incidence of PONV in the placebo group was 71%, Ondansetron decreased the incidence of PONV to 46% [relative risk reduction(RRR); 35%], and dexamethasone decreased the incidence of PONV to 54% (RRR; 24%). The ondansetron 8 mg and dexamethasone 10 mg combination decreased the incidence of PONV to 33% (RRR; 54%) which was similar to the predicted incidence of PONV 35% (RRR; 51%).
**Conclusion(s):** Combination of ondansetron 8 mg and dexamethasone 10 mg prevents PONV additively. This additive effect may be due to different mechanism of action, and they acted independently each other.
**References:**
1. Habib AS, Gan TJ. Can J Anaesth 2004; 51: 326-41.
2. Wang PK, et al. World J Surg 2012; 36: 775-81.
3. Apfel CC, et al. . N Engl J Med 2004; 350: 2441-51.

## 03AP01-4

### Abducens nerve palsy following spinal anaesthesia

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**Background:** Cranial nerve (CN) palsy is a rare complication of spinal anesthesia ( 1:300 to 1:8000). The abducens nerve (CN 6) is most frequently affected because of its long intracranial course. CN 6 palsy usually occurs 4 to 14 days post puncture, can be unilateral or bilateral and is usually associated with post lumbar puncture headache (PLPH).[1]
**Case report:** A 67 years old ASA II woman underwent revision of total hip arthroplasty due to dislocation 3 days after the initial operation. The preoperative physical examination and laboratory testing was normal. A single shot spinal anesthesia was performed at the L2-L3 interspace with a 25G spinal needle and the injection of 12mg chirocaine 0.5% and 10 γ fentanyl. Surgery was uneventfull, but six hours later the patient complained for diplopia, without other neurological symptoms (headache, backache, sensory or motor deficits). Clinical examination revealed a right CN6 paresis, with binocular horizontal diplopia which was worse on right gaze. Blood laboratory tests, brain CT scan and MRI did not reveal any pathology. The review of the previous anesthetic chart showed that the patient had received spinal anaesthesia 3 days ago, at the same interspace with a 23G needle. The patient underwent weekly ophthalmological examination until diplopia resolved spontaneously after 32 days.
**Discussion:** CN6 palsy is a rare complication of spinal anaesthesia usually associated with PLPH that occurs 4 to 14 days after the block. In this case report, the patient did not develop PLPH, and the paresis occurred within 3 days and 6 hours after the first and second spinal shot respectively. It is suggested that the cerebrospinal fluid (CSF) leakage leads to intracranial hypotension, traction of the CN6 and subsequent nerve dysfunction. Therefore, it is possible that in this case, the CSF leakage after the second spinal was superimposed to the ongoing leakage caused by the first anaesthetic, although PLPH was not observed.
**Reference:**
1. Day C J E, Shutt L E. Auditory, Ocular, and Facial Complications of central neural block. A review of posible mechanisms. Reg Anesth 1996; 21: 197-201
**Learning points:** Diplopia due to CN6 palsy after spinal block is a rare and late complication usually associated with PLPH. In this case, diplopia was the only symptom developing shortly after the block, showing that a high index of suspicion is needed to diagnose potential complications in the postoperative period.

## 03AP01-5

### Intracranial subdural hematoma following spinal anesthesia in a pregnant patient: case report and review of the literature

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**Background:** Postdural puncture headache is a well- known complication of spinal anesthesia, but the subsequent development of intracranial subdural hematoma is a serious life-threatening complication which should be urgently treated.
Our report reviews the literature on 49 patients who developed a postdural puncture headache complicated by intracranial subdural hematoma following spinal anesthesia.
**Case report:** A 32 year old, 65-kg, 165-cm pregnant woman (G4 P3) was scheduled for cesarean section at 39 weeks gestation because of breech presentation.
The patient was consented for spinal anaesthesia. Oxygen saturation, noninvasive arterial blood pressure and heart rate were continuously monitored in the operating room. On the first attempt, spinal anesthesia was performed with the patient in sitting position with a 25-gauge Quincke type spinal needle at the L3-L4 interspace using 12.5 mg of 0.5% isobaric bupivacaine. There was no blood or paraesthesia during insertion of the needle and she had adequate block.
Twenty-four hours after surgery the patient experienced fronto-temporal postural headache, which was treated as postdural puncture headache with bed rest, intravenous hydration and simple analgesics. Her headache was continuous even when she was discharged from the hospital on the fourth postoperative day. Following discharge her headache worsened to the point where she could no longer nurse her baby, her headache became non-postural, and not relieved with analgesia medications. On the 30th day postoperatively, the patient presented to the emergency room complaining of severe non-postural headache accompanied with blurring of vision, nausea and dizziness. There was no history of trauma. Neurological examination demonstrated mild upper and lower left limb weakness. A computed tomography (CT) scan revealed a 15 mm thick acute subdural hematoma involving the right cerebral hemisphere convexity causing mass effect into the underlying hemisphere sulci (Figure 1).
**Discussion:** Postdural puncture headache (PDPH) is a frequent, unpleasant complication of lumbar puncture and spinal anesthesia. The mechanism that is proposed for this phenomenon is the persistent leakage of cerebrospinal fluid through the dural puncture site, leading to the caudal displacement of the brain with traction on pain-sensitive structures and the thin subdural bridging veins, possibly causing a slow and constant blood leakage from these veins [5].

## 03AP01-6

### Pneumoencephalus and seizure after sequential anesthesia: cause or incidental finding - a case report

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**Background:** Pneumoencephalus (PC) is the presence of intracranial air, its development following neuroaxial anesthesia is extremely rare and most cases due to epidural block have been associated with loss-of-resistance to air (LORA) technique. Seizures in the post-operative setting have multiple causes.
**Case report:** 60-year-old female, ASA III (class III obesity, hypertension, diabetes mellitus and lumbar spondylolisthesis) admitted electively for total knee replacement surgery. After 5 attempts a sequential anesthesia with the LORA technique was performed. The patient was sedated with midazolam (4mg) and was on spontaneous ventilation and hemodynamically stable throughout the peri-operative period.
Post-operative analgesia was made with epidural morphine. Was discharged from the PACU after 5 hours without incidents. 13 hours after the anesthesia was intubated and ventilated by the emergency medical team after a generalized tonic-clonic seizure. PC was discovered on evaluation and there was cooperation from anesthesiology, ICU and neurosurgery The reevaluation revealed severe hypercapnia and respiratory acidosis. After acknowledgement that the patient was always asymptomatic and given the time lapse between the sequential anesthesia and the symptoms, the hypercapnia was admitted as a major cause. There was resolution of the respiratory acidosis and hypercapnia and the patient was uneventfully extubated. Afterwards, a history of obstructive sleep apnea (OSA) was recognized and the patient continued follow-up by pulmonology. Remained asymptomatic and was discharged home 8 days later.
**Discussion:** The probable cause of the seizure was multifactorial with the OSA, sedation and opioid as major possibilities. Although the patient didn't report any symptoms suggestive of PC and there were more probable causes for the seizure, the PC finding was incidental and induced a fixation error.
**References:**
Kozikowski, G. P. Cohen, S. P. (2004) Lumbar Puncture Associated with Pneumocephalus: Report of a Case. Anesth Analg 98:524-6
Chau, H. M. Mokhlesi, B. Chung, F. (2013) Obesity Hypoventilation Syndrome and Anesthesia. Sleep Med Clin. 8(1): 135-147.
**Learning points:** PC is very rare, even when using the LORA technique, usually has early symptoms and seizure is an infrequent sign. A multidisciplinary approach of post-operative complications allows for early recognition of its real causes and minimizes the fixation errors.

## 03AP01-7

### Syringomyelia after thoracic epidural catheterization in an anesthetized patient: is the anesthesiologist to be blamed?

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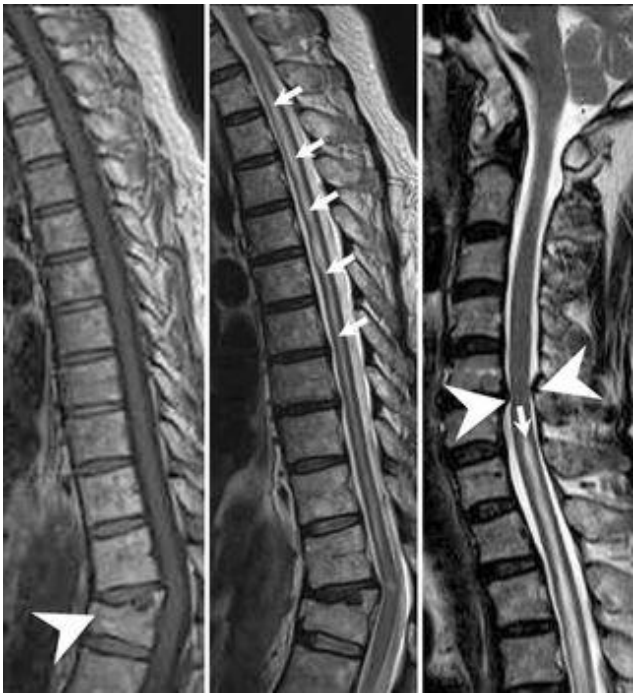
**Background:** Anesthesiologists often perform thoracic epidurals in awake patients in fear of neurologic injury.
**Case report:** A 64-year-old woman with a history of rectum cancer was general anesthetized for mini-laparotomy. Surgeons decided to perform debulking surgery and asked for epidural blockade. The catheter was inserted at T11-12 and threaded cephalic 5 cm after several attempts. Two days later, she complained about numbness and weakness of legs. Neurological examination identified Brown-sequard syndrome. Magnetic resonance imaging(MRI) showed intramedullary lesion from C6 to T12 with high intensity in T2-weighted image, compatible with syringomyelia(syrinx)(Fig 1). She improved gradually and walked with assistance two weeks later. One year later, she still felt numbness up to T6.



*[Fig 1]*

**Discussion:** Syrinx is a cystic arachnoiditis and characterized by pain, sensory loss and muscle weakness. The mechanism of syrinx formation in this case is equivocal. First, no CSF come from the needle or catheter during the process. Second, there was neither permanent paraplegia nor cord contusion with segmental slitlike lesion which suggested cord catheterization indicated by previous cases[1-3]. We assume some tissue cut off and plug the needle without notice, jeopardize “loss of resistance” technique and result in spinal cord penetration during initial attempts. The neurological deficit was not like complete spinal cord injury may because medullary fascicles were separated without transection and the catheter reached epidural space in the end. MRI also showed spinal stenosis at C5-6 due to thickened ligmentum flavum and T12 compressive myelopathy owing to compression fracture (Fig 1), which blocked CSF flow, altered CSF circulation and caused syrinx.
**References:**
1. Kao MC,Tsai SK, Tsou MY, et al. Anesth Analg. 2004;99(2):580-583
2. Nagathan DS, Singh BP, Ghatanatti S, et al. Acta Anaesthesiol Taiwan. 2012;50(2):81-83
3. Takii Y, Sunouchi K, Tadokoro M, et al. Anesth Analg. 2006;103(2):513
**Learning points:** Anesthesiologists may be request for epidurals after the patient been anesthetized. We do not recommend epidural catheterization until patients have regained consciousness.

## 03AP01-8

### Epidural catheter: where does it go?

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**Background:** Chemoembolization is a combination of local delivery of chemotherapy and a procedure called embolization to treat cancer. In chemoembolization, anti-cancer drugs are injected directly into the blood vessel feeding a cancerous tumor. Synthetic material called an embolic agent is placed inside the blood vessels that supply blood to the tumor, in effect trapping the chemotherapy in the tumor. Reports on the use of Drug-Eluting Bead Irinotecan (DEBIRI) in transarterial chemoembolization therapy for metastatic colorectal cancer show promising results. In order to reduce the painful response, it can be used intravenous sedation associated with epidural analgesia for the procedure and postoperative follow-up, which has demonstrated favorable results.
**Case report:** A 79-year-old male patient, who has been diagnosed with right colon adenocarcinoma including liver metastasis, was submitted to DEBIRI procedure by an interventional radiologist. After intravenous sedation, epidural catheter was taken place. Epidurography was performed by injecting intratecal contrast through the epidural catheter, just to certify its tip position, prior morphine and local anesthetic injection. At this moment, it was noticed that the catheter drew a circle appearance, with its tip pointing downward in the direction of the lower limbs. The catheter was then pulled and replaced under direct visualization by fluoroscopy, until its tip was pointed up. Successful analgesia was obtained. No complications were observed.
**Discussion:** Continuous epidural analgesia is considered the gold standard for the management of postoperative pain. Unfortunately, even following the precise technique for introducing the epidural catheter, its blind insertion is not certainty related with its proper positioning. Literature reports that insertion of excessive amounts of catheter into the epidural space is a risk factor for knot formation. Nevertheless, the optimal amount of catheter to insert into the epidural space, to minimize complications, is still a matter of debate. [1]
**Reference:**
1. Renehan EM, Peterson RA, Penning JP, Rosaeg OP, Chow D. Visualization of a looped and knotted epidural catheter with a guidewire. *Can J Anaesth*. 2000;**47**:329-33.
**Learning points:** We aimed to call attention for the occurrence of unexpected positioning of the epidural catheter, possible related with analgesia failures in painful procedures.

## 03AP01-9

### Neuraxial anaesthesia after spinal bone tuberculosis (SBT): case review

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**Introduction:** Despite tuberculosis (TB) being an infrequent disease in Europe, its incidence has rised as a result of increasing migration from endemic areas. In 1% TB affects the spine (the so called Pott’s disease). Optimal treatment duration and bone healing criteria remain controversial. Thus neuroaxial techniques in patients with treated Pott’s disease are conflicting.
**Case report:** A 25-year-old female from Pakistan 37 weeks pregnant, requested epidural analgesia during labour. She suffered tuberculous spondylodiscitis (T11-L1 abscess, 9x4 cm) with paresthesias in the left lower limb the year before. Pregnancy was not controlled until week 20th, and there were language communication difficuties.
She received quadruple therapy against TB for 12 months and the abscess was percutaneously evacuated. TB treatment finished at the end of the first trimester of pregnancy, remaining asymptomatic ever since. At six months of treatment, a MRI was performed showing improvement. However, persistent infection could not be excluded because of persistence of granulation tissue. By agreement with obstetricians and midwives epidural analgesia was avoided, and iv analgesia provided (meperidine) throughout labour, which occurred without incidences. The newborn Apgar was 9/10.
**Discussion:** Several case reports have been published regarding the use of neuraxial techniques in patients with undiagnosed SBT. Neurological sequelae range from none to paraplegia.

There are no references on the use of neuraxial anaesthesia in patients with treated SBT, probably because there is no consensus on the optimal duration of the treatment and on the criteria of complete healing. The WHO and the American and Canadian Thoracic Societies recommend a fixed duration of treatment (between 6 and 12 months). In spite of this, recent reports suggest that the completion may be supported by MRI criteria as, in some asymptomatic patients, lesions remain beyond the 12 months of treatment.
**Conclusions:** There is not enough evidence to assume that the end of the treatment reflects the safety time frame needed to perform a neuraxial technique in patients with SBT. It seems reasonable to verify the absence of lesion on MRI before performing neuraxial techniques.

## 03AP01-10

### Is awake the answer in high-risk patients needing shoulder surgery?

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**Background:** Shoulder surgery often requires the patient to be in the sitting position (beach chair) and this can cause dramatic haemodynamic instability. [1][2] We present the case of a high-risk 80 year old male patient who underwent shoulder surgery carried out in the beach chair position. He was deemed to be high risk for a general anaesthetic so a regional technique with sedation was used. The surgical incision was up to seven centimetres from the acromion edge (figure1); therefore, to provide complete anaesthesia of the shoulder a low approach interscalene and superficial cervical plexus block was carried out.
**Case report:** An ultrasound guided interscalene with a superficial cervical plexus block was used with 1% prilocaine 10mls and 0.375% levobupivacaine 20mls administered. The block was checked by confirming numbness over the anterior and posterior aspects and inability to actively flex and abduct the shoulder. Intraoperatively the patient remained stable with no drop in blood pressure, and the surgery went successfully. At the end of surgery the patient woke up quickly despite a long operating time. Within fifteen minutes of arrival in recovery he was comfortable, oriented and pain free. And he was extremely satisfied with the outcome and completed a patient satisfaction survey which confirmed this (figure 2).
**Discussion:** Because the patient had a previous history of stroke and myocardial infarction, maintaining a mean arterial pressure of more than 80mmHg was our target, along with maintaining a heart rate of around 60-65bpm. Tachycardia is very deleterious in a failing heart and is the most detrimental factor in managing Bezold-Jarisch reflex.[3] Keeping the patient awake during surgery helped us to adequately assess cerebral perfusion considering his pervious history of stroke.
**References:**
1. Beecroft CL, Coventry DM. Anaesthesia for shoulder surgery. Contin Edu Anaesth Crit Care Pain 2008;8(6):193-8.
2. Gardner BM. The beach chair position *S Afr Fam Pract* 2015;57(2)(Suppl 1):S6-S9.
3. Kinsella SM, Tuckey JP. Perioperative bradycardia and asystole: relationship to vasovagal
**Learning points:**
• General anaesthesia in elderly patients present many problems
• Beach chair position shoulder surgery has many possible risks
• Regional anaesthesia has tremendous advantages over general anaesthesia in this type of surgery by maintaining haemodynamic stability and cerebral and spinal cord perfusion.

## 03AP01-11

### Tattooing and regional anesthesia

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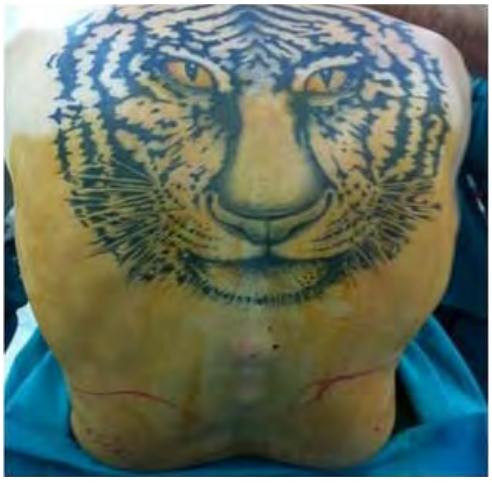
**Background:** Tattooing has experienced a boom since the 1990s, with a current prevalence of ~25% among americans aged 24-50 years. Pigments penetrating the dermis remain definitively whereas pigments limited to the epidermis are shedded during the first few weeks. Originally, pigments were inorganic (titanium dioxide, cadmium sulfate, chromium oxide, iron oxide and carbon), but the use organic pigments of uncertain composition is increasingly common. Anesthesiologists see a growing number of tattooed patients in their daily practice.
**Case report:** A 35-year old patient (P1) with a tattoo in the posterior thoracic area (approximately reaching T12) was submitted to abdominal liposuction from the xiphoid process down under lumbar peridural anesthesia (L1-L2) with local anesthetic and opioid using a catheter introduced up to 5 cm above the puncture.
**Discussion:** Widely used pigments of unknown composition, which have not been regulated or officially approved for use in humans, may have potentially carcinogenic or cytotoxic effects on the nervous system if deposited in sites such as the interspinous ligaments and the epidural and intrathecal spaces. The resulting pathologies may take years to develop and are rarely diagnosed early. Pigments have been found in axillary lymph nodes positive for malignant melanoma 30 years after tattooing. Likewise, in a 34-year old pregnant woman, pain and hypersensitivity were likely precipitated by pigments deposited in nerve tissue during epidural anesthesia, although the cause could not be established with absolute certainty. To our knowledge, no other studies or case reports have described serious complications from spinal or epidural puncture through tattooed skin, and some authors have even questioned the existence of a risk.



*[Tattoo]*

**References:** Frederic J. Mercier and Marie-Pierre Bonnet. Tattooing and various piercing: anaesthetic considerations. Current opinion in Anaesthesiology 2009, 22:436-441.
**Learning points:** Anesthesiologists should avoid direct puncture of tattoos by preferring untattooed skin surfaces or paramedian puncture.

## 03AP01-12

### An alternative approach to spinal anaesthesia complications

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**Background:** Although spinal anaesthesia complications are quite rare at this time, they are severe and present a challenge for every physician. They are related to the technique itself or to the substances being administered during the anaesthesia. Sometimes, the standard treatment for these complications is ineffective, therefore the physician is compelled to try alternative solutions to the problem. Practice concerning complementary and alternative medicine is currently an area of considerable interest.
**Case report:** A 40 year old female was admitted for a right ankle fracture. The pacient underwent open reduction and internal fixation of right ankle fracture under spinal anesthesia with 0.5 % 12 mg plain bupivacaine, at L2-L3 intervertebral space, using pencil point 25 - gauge needle, with the patient in sitting position. Forty-eight hours later, a sudden onset of severe headache, nausea and vomiting was noted. The patient was advised to bed rest, iv and

oral fluids, analgesia as per protocol and oral caffeine sodium benzoate. The symtpoms persisted, therefore the patient was given a phytotherapeutic drug composed of Zingiber officinale (30 mg) and Salvia officinalis (20 mg), tablets which were administered sublingual, six tablets per day for two days, with the patient's consent.
**Discussion:** Twenty-four hours after the phytotherapeutic drug was administered, the symptoms disappeared.
Post dural puncture headache mechanism is not fully understood. Ginger is reported in Ayurvedic system of medicine to be useful in neurological disorders; it has been shown to exert potent antiemetic properties, but its precise mode of action has not yet been elucidated (either by an antagonist effect on 5 HT-3 receptors, an antagonist effect over serotonin receptors, or an anticholinergic or antihistaminic effect).
**Learning points:** Spinal anaesthesia complication approach can come from various perspectives. There are no known side effects for the phytotherapeutic medication, other than allergic reactions to the plants themselves, therefore the study of such an alternative can be extended to a cohort type study. The treatment can be an alternative to the classic treatment when there are contraindications for the latter. Informed consent was obtained from the presented patient.

## 03AP02-1

### Intrathecal injection of bupivacaine on the contents of excitatory and inhibitory amino acids of spinal cord in rats

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**Background and Goal of Study:** Neuraxal anesthesia combined general anesthesia has been widely used in anesthesia practice due to its good properties. Our previous study found that the spinal and epidural anesthesia had sedative effect, but its mechanism still not clear. We hypothesize the sedation of subarachnoid block is related to the influence of bupivacaine on the release of excitatory and inhibitory amino acid in the spinal cord.
**Materials and methods:** 24 male Sprague-Dawley rats were randomly divided into three groups: control group (group C, n=8), Saline group (group NS, n=8), 0.5% bupivacaine group (group B, n=8). And the rats were intrathecally administrated 25 microliter of saline and 25 microliter of 0.5% Bupivacaine in the group NS and group B, respectively.
Ten minutes after injection, the rats were sacrificed and removed lamina and took out the spinal cord, then placed the spinal cord below thoracic vertebra (T10) in the vials of 1.8ml. Numbered the samples and preserved them in the -80 degrees freezer. The contents of excitatory amino acid aspartate (Asp) and glutamate (Glu) and inhibitory amino acid γ-aminobutyric acid (GABA) and glycine (Gly) in the rat spinal cord were detected by using the automatic amino acid analyzer (German, S-433D).
**Results and discussion:** The content of GABA in the rats spinal cord in group B (0.65±0.10) microgram/mg were significantly increased comparing with group C (0.48±0.12) microgram/mg and group NS (0.49±0.12) microgram /mg ($P<0.01$, $P<0.05$); The content of glycine (Gly) in the rats spinal cord in group B (1.13±0.20) microgram/mg were significantly increased comparing with group C (0.91±0.16) microgram/mg and group NS (0.76±0.13) microgram/mg ($P<0.05$, $P<0.01$); however, the content of glutamate (Glu) in the rats spinal cord in group B (0.91±0.16) microgram /mg were significantly decreased comparing with group C (1.07±0.12) microgram /mg and group NS (1.14±0.67) microgram/mg ($P<0.05$, $P<0.01$). The sedative effect of subarachnoid block may be related to the changes of excitatory and inhibitory amino acid in the spinal cord.
**Conclusion(s):** Bupivacaine spinal anesthesia can increase the contents of inhibitory amino acid (GABA and Gly) and decrease the contents of excitatory amino acid glutamate.

## 03AP02-2

### The interaction and optimal match ratio of levobupivacaine and hydroxyl derivative of QX-314 in producing long-lasting sensory-predominant nerve block in rats

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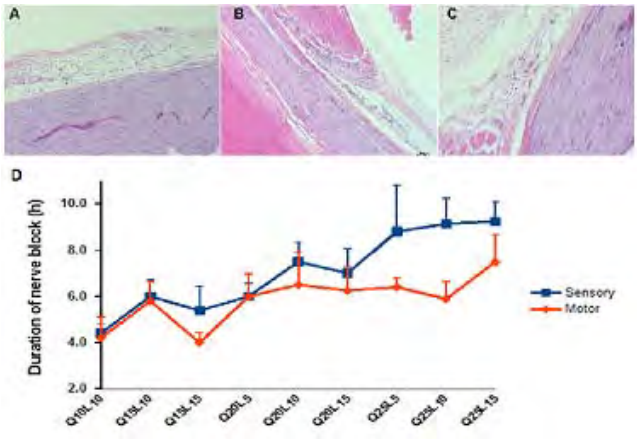
**Background and Goal of Study:** It is reported that bupivacaine with co-applied QX-314 produced prolonged sciatic nerve block in rodents, indicating a potential strategy for long-lasting local anesthesia. But both drugs have concentration-dependent systemic and localized toxicity. Combination use of local anesthetics further enlarges the risks.
We replaced bupivacaine with its S-isomer levobupivacaine; and substituted QX-314 with its hydroxyl derivative, QX-OH. We tested whether the new combination would produce prolonged nerve blockade in rats without severe toxicity. To optimize the formula of the new combination, the interaction molar match ratio of two drugs were investigated.
**Materials and methods:** Sensory and motor blockade from peri-sciatic nerve injection of levobupivacaine (LB) at 1~5 mM, QX-OH at 5~25 mM, or combination of LB and QX-OH were evaluated by hot plate and extensor postural thrust test in rats, respectively. $EC_{50}$ for each drug was estimated by "Bliss" method. Systemic and local toxicity were assessed. Response surface modeling was used to investigate the interaction and optimal match ratio of LB and QX-OH.
**Results and discussion:** The $EC_{50}$ for LB and QX-OH were 1.8 mM and 16.1 mM, respectively. QX-OH with LB produced intense sensory blockade up to 12 h, and motor block lasted for 8 h in maximum. Synergistic relationship was revealed between the two drugs; the optimal match ratio (molar) for levobupivacaine to QX-OH was 1: 0.454. No severe systemic or local toxicity was observed.
**Conclusion(s):** Levobupivacaine and co-applied QX-OH facilitate long-lasting, sensory-predominant nerve block without obvious systemic and local toxicity. The maximum effect of QX-OH and levobupivacaine on nerve blockade was reached at molar ratio of 1: 0.454.




*[Sciatic nerve block and histological results]*

## 03AP02-3

### Neurotoxic effects of intraneurally or perineurally injected solutions of saline and increasing concentrations of ropivacaine in the sciatic nerve of Wistar rats

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**Background and Goal of Study:** Using an animal model, this study examined the neurotoxic effects of varying concentrations of ropivacaine when injected perineurally.
We hypothesized that neurologic injury after intraneural application of ropivacaine will be greater with increasing concentration of ropivacaine.
**Materials and methods:** After approval by the Laboratory Animal Care and Use committee, the sciatic nerves of 50 Wistar rats were exposed bilaterally. The 100 sciatic nerves were randomized to receive one of four concentrations either of ropivacaine(0.2%-0.5%-0.75%-1%) or saline intraneurally (R) or perineurally (L). Needles were placed under optic microscopy guidance; opening injection pressure data were also recorded. Neurologic examinations were performed at baseline 1,2,3,4,5,6,24,48 and 72 h by blinded assessors. After 3 days the sciatic nerves were histologically examined for qualitative and quantitative evidence of nerve damage.
**Results and discussion:** The degree of histologic evidence of nerve injury correlated with the concentration of ropivacaine; higher concentrations were associated with greater degree of injury. While increasing concentration of ropivacaine resulted in longer duration of blockade, there was no evidence of histologic injury with perineural injections. Intraneural injections resulted in motor and sensory neurologic deficit and increased microscopic indices of nerve damage. In contrast, perineural injections resulted in transitory neurologic deficit and no nerve damage. Indices of neurologic damage were increased at higher concentrations of ropivacaine. Injury occurred only with injections that resulted in high opening injection pressures.
**Conclusion(s):** When applied intrafascicularly, ropivacaine exhibited concentration dependent neurotoxic effects with histologic evidence of nerve damage. The magnitude of this effect was concentration-dependent. Perineurally injected ropivacaine resulted in concentration-dependent duration of blockade without evidence of neurologic injury. Injury always occurred when needle placement was intrafascicular and high opening injection pressures at all concentrations of ropivacaine.

## 03AP02-4

### The spread of 20 ml vs 40 ml of dye injected into psoas compartment in cadavers

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**Background and Goal of Study:** Psoas compartment block, useful in hip surgery, in combination with sciatic nerve block needs rather large volume of local anesthetic.
Our aim was to compare the spread of 20 ml vs 40 ml of aqueous solution injected into psoas compartment.
**Materials and methods:** In 12 fresh adult cadavers, 0.01% methylene blue aqueous solution was injected after Capdevila et al [1] into psoas compartment, 20 ml at one side and 40 ml at the opposite side. Then the dye distribution along the vertebral bodies was analysed.
**Results and discussion:** The distance between the injection point and the caudal limit of the dye spread (M ± SD) was 9.3 ± 1.5 cm after 20 ml and 10.9 ± 2.1 cm after 40 ml, the difference being statistically significant (unpaired one-tailed t-test, p = 0.021), but clinically irrelevant. The upper (L1 vertebral body) and the lower (S1) limits of the dye spread were identical with both volumes, although these limits were reached in one cadaver (8%) only. L3 and L4 levels were stained densely with both volumes in all cadavers, L5 in nine (75%) with 20 ml and in ten (83%) with 40 ml, L2 in two (17%) and three (25%), respectively (non-significant difference, Fisher exact p = 0.5).
**Conclusion(s):** With both 40 ml and 20 ml injected into psoas compartment, the solution always spreads along L3 and L4, frequently along L5, and rarely along L1, L2, and S1 levels.

**Reference:**
1. Capdevila X., Macaire P, Dadure C., et al. Continuous psoas compartment block for postoperative analgesia after total hip arthroplasty: new landmarks, technical guidelines, and clinical evaluation. Anesth Analg 2002; 94: 1606-1613.

## 03AP02-5

### Subclinical dosages of bupivacaine with QX-314 produced long-lasting and non-selective sciatic nerve blockade

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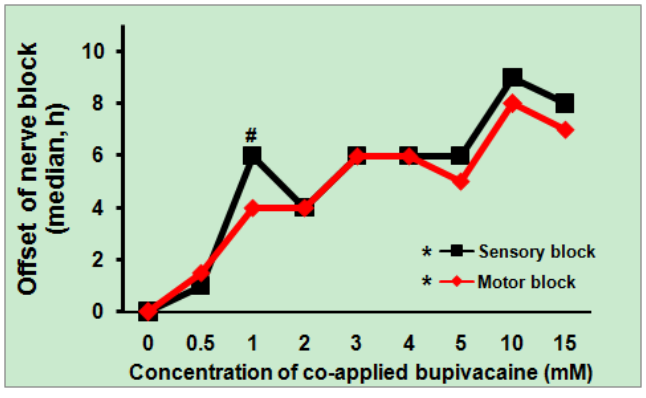
**Background and Goal of Study:** QX-314, the impermeable quaternary derivative of lidocaine, produced long-lasting, sensory flavoring nerve block with co-applied bupivacaine when both were used at 0.5%, indicating a potential strategy for attenuating peri-operative pain. Bupivacaine activates transient receptor potential (TRP) channels, facilitates cellular entry of QX-314, and theoretically may serve as enhancer; while QX-314 may be the active ingredient in this combination. We assumed that the enhancement of bupivacaine may be achieved at lower dosages.
**Materials and methods:** Sprague Dawley rats received peri-sciatic injection of 15 mM (0.5%) QX-314 alone or with bupivacaine from 0.5 mM (0.016%) to 15 mM (0.5%). Sensory and motor block were assessed by hot plate test and extensor postural thrust test. Local toxicity was evaluated by histological examination one week after injection.
**Results and discussion:** Median (25$^{th}$ percentile, 75$^{th}$ percentile) time of sensory and motor block from 0.5% QX-314 alone were 0 (0, 0.75 h) and 0 (0, 0 h) respectively. When bupivacaine was co-applied, there was no difference among the onset of nerve blockade; however as concentration of bupivacaine increased from 0.5 mM (0.016%) to 15 mM (0.5%), the offset time of sensory blockade ranged from 1 h (0, 3 h) to 9 h (8 h, 10.5 h) ($p$ <0.001 among groups), the offset time of motor blockade lasted from 1.5 h (0, 3 h) to 8 h (8 h, 10.5 h) ($p$ <0.001 among groups). There was no difference between sensory and motor block in all combinations except for QX-314 with 1 mM (0.03%) bupivacaine. No severe neurotoxicity or myotoxicity was observed.
**Conclusion(s):** The potential of QX-314 in peripheral nerve block was promoted by bupivacaine at concentration as low as 0.016%, while 0.016% bupivacaine or 0.5% QX-314 alone is hardly effective at all. Moreover, the combination of QX-314 and subclinical dosage of bupivacaine did not demonstrated sensory-preference, unlike when bupivacine was used at high dosage. This may indicate unknown mechanisms that exist in both sensory and motor peripheral fibers.




*[Sciatic nerve block from QX-314 with Bupivacaine]*

## 03AP02-6

### Development of an experimental model to evaluate bupivacaine induce ventricular arrhythmias in a porcine experimental model.Preliminary evaluation of intralipid

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*[1]Hospital General Universitario Gregorio Marañon, Dept of Anaesthesiology & Intensive Care, Madrid, Spain, [2]Hospital de Madrid Norte-Sanchinarro, Dept of Anaesthesiology & Intensive Care, Madrid, Spain, [3]Universidad Complutense de Madrid, Toxicología y Legislación Sanitaria, Madrid, Spain*

**Background and Goal of Study:** Unintentional intravenous administration of bupivacaine might produce life-threatening arrhythmias.Despite the fact that several clinical reports and animal studies have described the occurrence of lethal ventricular arrhythmias associated with bupivacaine intoxication, there is limited information regarding essential characteristics of these arrhythmias. Furthermore, no arrhythmias were provoked in some reports of bupivacaine intoxication after ventricular pacing.(1)
Our aim was to develop a reproducible model to study paced induced ventricular arrhythmias in the context of bupivacaine intoxication, and evaluate if intralipid administration protect of these arrhythmias.
**Materials and methods:** 6 Large-White pigs were premedicated with ketamine and anesthetized with intravenous sodium thiopental 5mg-kg.The anesthetic maintenance was performed with sevoflurane 1 MAC(2.6%). Femoral artery and vein were canalized for invasive monitoring, analytical blood gas samples and bupivacaine levels determinations. 2 quadripolar catheters were used for stimulation and intracardiac recordings and advanced to the high right atrium and to the right ventricular apex.
After instrumentation a bupivacaine bolus of 4 $mg.kg^{-1}$ was administered followed by a continuous infusion of 100 $\mu g.kg^{-1}.min^{-1}$.A modified programmed ventricular stimulation protocol was performed (at baseline and after 15 min of bupivacaine perfusion).The ventricle was paced at maximal current strength (at 3 basic cycle lengths (350,400 and 600 ms).
After an 8-beat pacing train, programmed stimulation was initiated with coupling intervals of 290, 280, 270, and 260 ms for the first through fourth extrastimuli. In 2 additional animals an IL infusion was administrated 3 min after bupivacaine bolus dose.
**Results and discussion:** At baseline, no animals except one, developed ventricular arrhythmias after the ventricular stimulation protocol,however sustained ventricular tachydysrhythmias occurred in 87,5% of the animals with the administration of bupivacaine. Intralipid did not prevent the development of ventricular arrhythmias.
**Conclusion:** We have shown that this experimental model is useful to evaluate and investigate bupivacaine-induced ventricular arrhythmias. Our preliminary data show that intralipid was not effective to prevent paced-induced ventricular arrhythmias in the context of a porcine experimental model of bupivacaine intoxication
**References:**
1. Groban L et al. Anesth Analg 2000;91(5):1103-11

## 03AP02-7

### Bupivacaine at 0.03% in combination with QX-314 at 0.5% produced sensory-predominant nerve blockade related to hyperpolarization-activated cyclic nucleotide-gated channels

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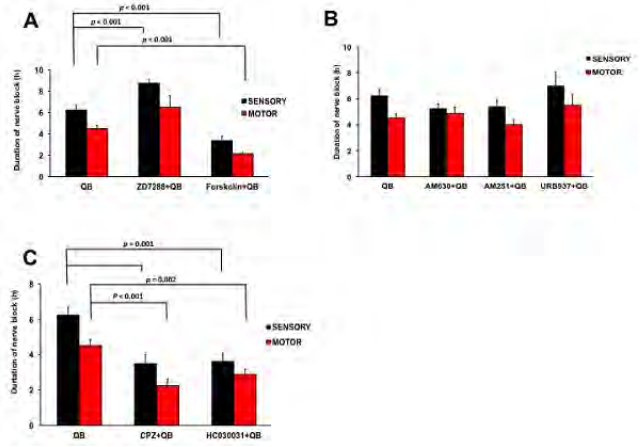
**Background and Goal of Study:** QX-314, the impermeable derivative of lidocaine, is well known to produce sensory-selective local anaesthesia through activating TRPV1 channels in sensory neurons. Recently, it has been reported that bupivacaine induced cellular entrance of QX-314 through unidentified TRP-independent pathways. Since hyperpolarization-activated cyclic nucleotide-gated channels (HCN) and endocannabinoids are involved in local anaesthesia, we tested whether they contributes to nerve blockade from bupivacaine with QX-314.
**Materials and methods:** Sprague Dawley rats received sciatic nerve block with mixture of bupivacaine and QX-314 (QB), 30 min after pretreated with intraperitoneal inhibitor/activator of TRPV1 (capsaizepine, CPZ), TRPA1 (HC030031), HCN (ZD7288/forskolin) or cannabinoid receptors (AM251, AM630/URB937) (n = 8). Sensory and motor functions were evaluated by revised hot plate test and postural extensor thrust. Bupivacaine and QX-314 were given at their $EC_{50}$.
**Results and discussion:** Compared with 6.3 ± 0.5 h of analgesia and 4.5 ± 0.3 h of immobility elicited by QB, pretreatment of ZD7288 resulted in prolonged sensory block for 8.8 ± 0.4 h ($p$ <0.001) and motor block for 6.5 ± 1.1 h ($p$ <0.001). Both sensory (3.4 ± 0.4 h, $p$ <0.001) and motor block (2.1 ± 0.1 h, $p$ <0.001) significantly shortened after pretreated with forskolin.
Pretreatment of CPZ, HC030031, AM251, AM630, or URB937 did not alter the pattern of nerve blockade of QB. These data provided *in vivo* evidence that HCN, the "pacemaker channel" from super family of voltage-gated $K^+$ channel, involved in bupivacaine induced QX-314 entry of peripheral nerve fibers.
**Conclusion(s):** Activation or inhibition of HCN channels significantly altered nerve blockade from mixture of bupivacaine and QX-314, indicating that HCN channels may contribute to bupivacaine induced cellular entry of QX-314.




*[Sciatic nerve blockade]*

## 03AP02-12

### Evolution of the use-dependence block induced by bupivacaine after intralipid administration. Study in an experimental porcine model

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**Background and Goal of Study:** Depression of cardiac conduction due to the blockade of sodium channels is one of the primary mechanisms of bupivacaine's cardiotoxicity. Typically, the blockade induced by bupivacaine increases as the stimulation rate increases, and the recovery from block is slow. Experimental studies suggest that lipid emulsion is effective in reversing bupivacaine cardiac toxicity. We aimed to evaluate the temporal evolution of the use-dependence block induced by bupivacaine with the Intralipid administration.
**Materials and methods:** Five Large-White pigs were premedicated with ketamine and anesthetized with intravenous sodium thiopental 5mg-kg. The anesthetic maintenance was performed with sevoflurane 1CAM(2.6%). Femoral artery and vein were canalized for invasive monitoring,analytical blood gas samples and bupivacaine levels determinations. After instrumentation and monitorization,a bupivacaine bolus of 4 $mg.kg^{-1}$ was administered. Ventricular conduction (evaluated by QRS duration) was measured after ventricular pacing at cycle length of 400 ms on the baseline, after bupivacaine and 1, 5,10 and 30 minutes after Intralipid administration (1.5 mL/kg over 1 minute followed by an infusion of 0,25 mL/kg/min). Three additional animals served as a control group, saline infusion was administered instead of Intralipid.
**Results and discussion:** Bupivacaine induced and intense use-dependence effect, manifested in sinusal and stimulated QRS.

| | Sinus cycle length | | QRS duration in sinus rhythm | | 400pclQRS duration | |
|---|---|---|---|---|---|---|
| | Intralipid | Control | Intralipid | Control | Intralipid | Control |
| Baseline | 613±114 | 595 ±15 | 82±5 | 78±9 | 101±8 | 98±11 |
| Bupivacaine | 610±64 | 730±70 | 133±42* | 160±16 | 349±71* | 400±0 |
| 1 min after IL/saline administration | 638±87 | 673±87 | 129±27* | 151±47 | 374±35* | 365±55 |
| 5 min after IL/saline administration | 621±44 | 654±59 | 112±15* | 147±51 | 289±86* | 335±81 |
| 10 min after IL/saline administration | 633±57 | 639±73 | 96±10* | 116±33 | 197±57* | 266±97 |
| 30 min after IL/saline administration | 702±51 | 690±73 | 80±8 | 85±10 | 103±23 | 115±16 |

*[Tab1]*

$400_{PCL}$QRS: QRS duration at 400 millisecond pacing cycle length IL: intralipid
*P<0,05 compared with baseline.
**Conclusion:** Intralipid reversed the sinusal and paced QRS interval lengthening induced by the injection of bupivacaine. However 10 minutes after IL administration an important widening of the stimulated QRS persisted (Δ95%) whereas sinusal QRS duration was near baseline values. This finding suggests that the phenomena of bupivacaine cardiac toxicity persisted although the signs on the ECG apparently have normalized.
This data suggests that suitable monitoring should be continued until adequate heart conduction parameters were restored.

## 03AP03-1

### The effect of introducing non-traumatic lumbar puncture needles in a Danish neurological department on the number of blood patches performed. A retrospective study

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**Background and Goal of Study:** Postdural puncture headache (PDPH) is defined as a postural headache that occurs after a dural puncture. There are several risk factors for developing PDPH for example the design of needle tip. Severe PDPH is often treated with an epidural blood patch (EBP). It has previously been shown that the use of a non-traumatic needle reduces the risk of PDPH. However, recent studies have shown that the traumatic needle is still the first choice amongst Danish neurologists.
The aim of the study was to investigate if the introduction of non-traumatic needles would reduce the incidence of EBP after dural punctures in a Danish neurologic department.
**Materials and methods:** Before January 2013, almost all dural punctures were performed using a traumatic needle at our neurological department. From January 2013 to the end of September 2013, the neurologists were trained to use a non-traumatic needle.
In October 2013, the non-traumatic needle was implemented as first choice when performing the procedure.
In the periods from January 2012 to the end of December 2012, (period A) and from October 2013 to the end of September 2014, (period B) the number of dural punctures and EBPs were registered retrospectively. The indication for using an EBP for treating PDPH was not revised over the same period.
Chi square analyses were used for the binary outcome data (blood patch and no blood patch) between the two groups (”traumatic” needle dural procedure and ”non-traumatic” needle dural procedure).
A significance level of p=0.05 was used.
**Results and discussion:** In period A and period B, 1335 respectively 1300 procedures were performed.
The numbers of EBP in the two periods were 44 (3, 3%) and 18 (1, 4%).
Chi square analyses were used for the binary outcome data (EBP and no EBP) between the two groups (traumatic or non-traumatic needle). A significance level of p=0,05 was used.
The difference in the number of the need of EBP in the two groups came out statistically significant ($p$ = 0,002).
**Conclusion(s):** The incidences of EBP were reduced by changing the needle type, from a 20G or 22G traumatic needle to a non-traumatic needle. This study underlines the importance of using a non-traumatic needle for dural puncture in order to reduce the risk of developing severe PDPH.

## 03AP03-2

### How low can you go? A study comparing the accuracy of B-Mode ultrasound and strain elastography in the recognition of femoral and interscalene test doses in the soft embalmed Thiel cadaver model by anaesthesia trainees

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**Background and Goal:** Hydrolocation is a recognized means of detecting needle tip position during ultrasound guided regional anaesthesia. Volumes between 0.25ml & 1ml are injected in order to minimize neural damage in the event of accidental subperineural injection. Retrospective analysis have shown that between 1 in 6 & 1 in 3 intraneural injections may be missed. No test is able to differentiate between subperineural and supepineural injection. The objective is to assess the the accuracy of fusion elastography compared to B-mode ultrasound when injecting 0.25ml, 0.5ml or 1 ml test dose during interscalene & femoral nerve blocks in soft embalmed thiel cadavers.
**Materials and methods:** Engineers converted color strain elastography to white shadow, overlapped B-mode and created fusion elastography(fig.1).

*[Elastography1]*

53 femoral & interscalene nerve blocks on 2 soft embalmed thiel cadavers, both sides, randomized to 0.25ml, 0.5ml and 1ml, intra/extraneural injections recorded both fusion elastography & B-mode. 20 trainees viewed 12 seconds B-mode videos, without repeat(n=53) & fusion images of B-mode and elastography (n=53). Image interpretation; hydrolocation defined as perineural, intraneural and distant.Then rating the confidence of the location as low, moderate or high. The standard was set by consensus of 2 independent experts. statistical analysis using mixed effects regression model. NCSS area & brightness using ImageJ( NLM, Washington DC).
**Results and discussion:** In the area, mixed effects analysis showed differences in area between imaging modes (F value 8.0 p<0.001) but not volume (F value 3.1, p=0.06), nerve blocks p=0.72, sequence p=0.15, cadaver p=0.63 or side of injection p=0.48. In brightness analysis showed differences in brightness between imaging models (F value 223.9, p<0.001) & with increasing volume (F value 31.1, p=0.04). Nerve block p=0.13, sequence p=0.93, cadaver p=0.91 or side of injection p=0.85 had no effect.
20 trainees were tested, B-mode is only 60% sensitive in detecting tissue displacement.
**Conclusion:** Fusion elastography is a reliable mode of imaging test doses, it is a more sensitive indicator of tissue displacement using test doses between 0.25ml & 1ml.

## 03AP03-3

### Predicting the the safe depth of the caudal epidural space in caudal block for children using magnetic resonance imaging

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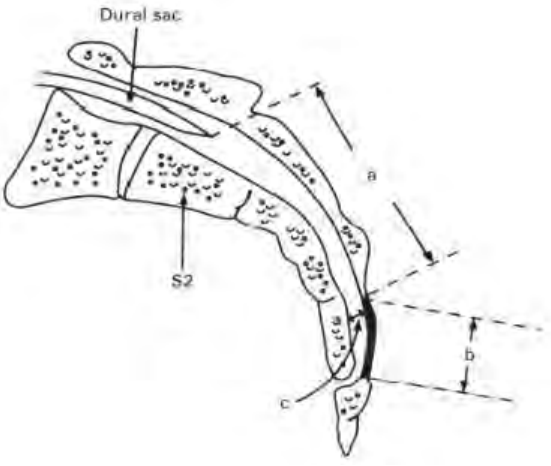
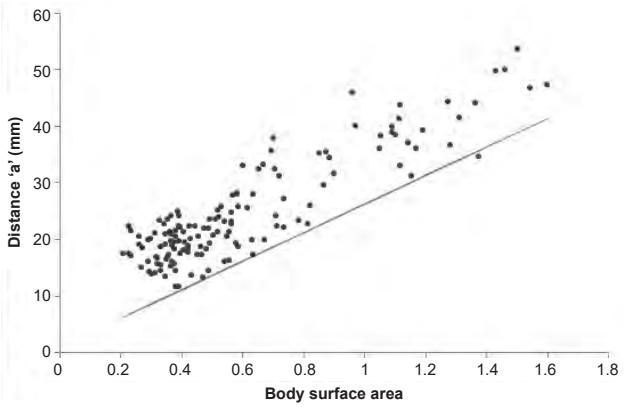
**Background:** Caudal block is often performed through the sacral hiatus to provide pain control to children undergoing urologic surgery or lower abdominal surgery. In order to prevent unintended dural puncture during the caudal block, the needle must not be advanced further after penetrating the sacrococcygeal ligament. However, the penetration of the sacrococcygeal ligament may not always be identified, and the dural sac of small children is located at a lower level than that of adults.
The aim of this study was to establish simple guidelines for predicting the safe depth of the caudal epidural space in children based on demographic data.
**Materials and methods:** The study's participants were children under 12 years old who had undergone lumbar-sacral magnetic resonance imaging. The T2 sagittal image of showing the best view of the sacrococcygeal membrane and the dural sac was chosen. We measured the distances using the centricity web PACS viewer. Distance 'a' represented the length from the upper margin of the sacrococcygeal ligament to the dural sac, distance 'b' was the length of the sacrococcygeal ligament, distance 'c' represented the maximum depth of the caudal epidural space including the sacrococcygeal ligament, and distance 'd' was defined as the length from the central point of the sacrococcygeal ligament to the skin.
**Results and discussion:** A total of 141 magnetic resonance images were analyzed. The study's participants were 20.0 months(1.00-154.00) when MRI imaging was taken. Their median weight and height were 11.5kg (3.40-60.00) and 82.7cm(50.00-159.50). The median BSA was 0.49 $m^2$(0.21-1.60). The age, height, weight, and BSA were highly correlated. Distances a, b, and c showed a high correlation with the child's age, weight, height and BSA.
Distance a showed the highest $R^2$correlation with the BSA. Based on those results, a simple formula was developed: distance a (mm) = 25 x BSA. fig2 When this formula was applied to the children in this study, the proportion of the needles predicted to be safely located in the caudal canal was 100% (95% CI 100-100).
**Conclusion(s):** The simple formula, 25 x BSA, can be recommended to calculate the safe depth of the caudal epidural space in order to prevent unintended dural puncture after puncture of the sacrococcygeal ligament during caudal block in children. However, further clinical studies based on this formula are needed.




*[Fig 1]*




*[Fig2]*

## 03AP03-4

### Ultrasound-guided continuous femoral nerve block: the influence of catheter orifice configuration (multi-orifice versus end-hole) on postoperative analgesia after total knee arthroplasty (TKA)

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**Background:** Multiorifice catheters provided superior analgesia and significantly reduced local anesthetic consumption compared with end-hole catheters in epidural studies. The demonstrated benefits of multi-orifice catheter result from a multi-orifice flow during an intermittent bolus regimen ensuring a wider local anesthetic spread which probably contributes to the better quality of the block in this clinical setting. This prospective, randomized study tested the hypothesis that, in an automated regular bolus continuous femoral nerve block (CFNB), a multiorifice catheter would reduce local anesthetic consumption compared with an end-hole catheter.
**Methods:** 80 adult patients undergoing primaryTKA were randomized to CFNB using either a multiorifice or an end-hole catheter. CFNB was inserted under ultrasound-guidance according to a short-axis in-plane technique. Once the catheter was secured and in place, an initial injection of 20 ml lidocaine 1% was performed through the catheter and then, an automated hourly 5 ml bolus of 0.2% ropivacaine was initiated in combination with 10 ml patient controlled analgesia (PCA) boluses of 0.2% ropivacaine and a lockout time of 60 min. All patients received general anesthesia and single-shot ultrasound guided sciatic nerve block. Number of ropivacaine(on demand) boluses delivered, local anesthetic consumption, verbal rating pain score (VRPS), rescue morphine analgesia, quadriceps maximum voluntary isometric contraction (MVIC) and side effects were recorded.
**Results:** During the first 24hrs, no differences were found in median number of ropivacaine boluses on demand between multiorifice and end-hole catheters groups respectively (4(2-7) vs. 4(2-8); p=0.297). There was a non-significant decrease in median ropivacaine consumption at 48hrs in the multiorifice catheter group (365ml (295-418) vs. 387ml (323-466); p=0.312). No significant differences were recorded between the 2 groups at 24 hrs regarding median average VRPS (2(0-3) vs. 2(0-4); p=0.519) and morphine consumption (0(0-20) vs. 0(0-20);p=0.264). Quadriceps MVIC % declined to 7% (0-20) and 10% (0-28) in the multiorifice and end-hole groups, respectively, at 24 h after surgery.
**Conclusions:** In the present study, catheter orifice configuration (multiorifice versus end-hole) did not influence the effectiveness of CFNB: similar quality of analgesia without reduction of local anesthetic and morphine consumption and equivalent postoperative quadriceps weakness.

## 03AP03-5

### Beyond Ispagula - exploring alternative antifreeze infused laxative products as ultrasound medium for employment in regional anaesthetic training phantoms

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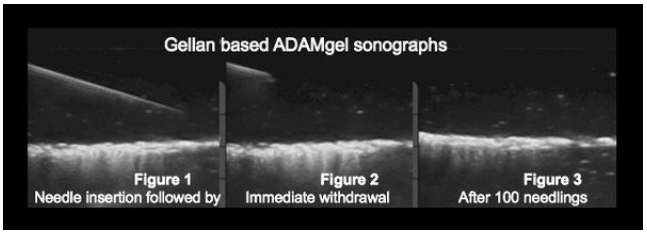
**Background and Goal of Study:** Previously, over a period of three years, we have developed and refined ADAMgel (Aqueous Dietary fibre Antifreeze Mix gel). This material is used as a tissue analogue for ultrasound based procedural training. It is produced by combining Ispagula (psyllium) husk, a commonly used dietary fibre laxative and food thickener, mono ethylene glycol (MEG), a standard antifreeze, and water, then heating it. This resulting material satisfies the criteria for the ideal ultrasound medium[1](IUM). Nevertheless we have continued to seek to improve the characteristics of this material and sought to establish whether other combinations of dietary fibre based laxative/food thickener ADAMgels might have similar potential as IUMs.
**Materials and methods:** We identified Gellan Gum as being a practical alternative to psyllium in that it demonstrates sufficient visco-elasticity to support ultrasound probe pressure. Accordingly concentrations of 2,4,6 and 8% were prepared with water in the ratio MEG 9/1 and tested against the criteria for IUM.
**Results and discussion:** Gellan based ADAMgel performed favourably against the criteria for IUM. It reproduced high- fidelity haptic human tissue simulation .Targets were clearly visible up to 10cm and stayed fixed in position with clearly identifiable needle -target contact. This medium can be cast, moulded, cold-pressed or assembled in layers to create phantoms of varying complexity. It is non-perishable and has shown no deterioration after 6 months' storage at room temperature. It can be prepared using basic equipment at €3/kg. Most significantly, it does not sustain needle insertion damage at gel concentrations <8%.(Fig1-3). This is of particular relevance to phantom models that are likely to be subject to multiple reuse.




*[Figure 1. Gellan based ADAMgel Sonographs]*

**Conclusion:** Gellan based ADAMgel appears to be a useful medium for the basis of construction of regional anaesthesia training phantoms.
**Reference:**
Simulators for training in ultrasound guided procedures. 1. S. Sultan, G. Shorten, G Iohom *Medical Ultrasonography* 2013; 5,(2): 125-131

## 03AP03-6

### Enhancing the ultrasound training experience by using phantoms incorporating electrical circuits

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**Background and Goal of Study:** The Electrical Conductivity of the ultrasound medium psyllium ADAMgel (**A**queous **D**ietary fibre **A**ntifreeze **M**ix gel) can be modulated by varying the concentrations of NaCl during preparation. We hypothesized this effect could be utilised to enhance the teaching experience using ultrasound guided needle manipulation in appropriately constructed phantoms.
**Materials and methods:** We adapted three phantom designs. We attached nerve stimulator needles (NSN) (B Braun) to low voltage circuits with 5mm of uninsulated cable(cathode) partially embedded in each of the phantoms combined with 3Volt LED indicator lights to enhance assessment of Ultrasound guided needle technique.
Model 1: simple design composed of ADAMgel matrix of low electrical conductivity with the uninsulated wire as the ultrasound target for use as a basic skill station.
Model 2: modified Fascia Iliaca block (FIB) Phantom incorporating layers of ADAMgel of increasing NaCl concentrations (hence increasing conductivity) incorporating subcutaneous, retro fascia lata and iliaca (both made from non latex sheet). The circuit's cathode was connected to the femoral nerve. This was used in FIB teaching sessions.
Model 3: breast tumour ultrasound guided biopsy model with a paraffin wax gel target (a sonolucent insulator) was evaluated for use as a training tool. The circuit's cathode were incorporated into the breast tissue made from conductive ADAMgel.
**Results and discussion:**
Model 1: The LED shone only when the 3V circuit was closed by the NSN needle tip touching the exposed wire target.
Model 2: Needling the FIB phantom the 3V LED (incorporated in a 9V circuit) shone incrementally brighter with each deeper tissue level traversed. It extinguished just before "popping" though the two fascial layers when the NSN tip indented the electrically insulating non latex sheet. The LED shone brightest with the needle tip in the correct compartment.
Model 3: The LED in the 9V circuit of the breast biopsy phantom shone progressively brighter with NSN tissue passage, but was extinguished when the NSN tip entered the tumour target. Feedback on all the models was strongly positive with predominantly 100% scores on Likert scale for evaluation as teaching tools.
**Conclusion:** Our work suggests targets and tissue layers can be identified by incorporation of electrical circuits within ADAMgel modified to improve conductivity in ultrasound phantoms, with the potential to enhance the learning experience.

## 03AP03-7

### Investigating the effect of Polydimethylsiloxane on the preparation of Psyllium and gellan based ultrasound mediums used in the construction of high-fidelity Regional Anaesthesia training phantoms

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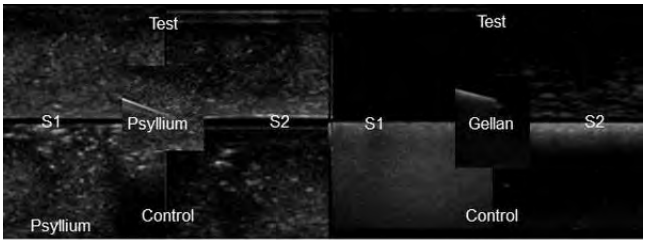
**Background and Goal of Study:** Air is the enemy of ultrasound (US) guided regional anaesthesia (USRA) as it thwarts US transmission. Human tissue is usually free of air, and precautions can prevent introduction. In USRA phantoms the visco-elastic properties needed for high-fidelity tissue analogue US mediums (USMs) makes them prone to foaming and air retention. This occurs with gellan gum and psyllium based USMs. Although a high gelling temperature ensures gel stability, boiling the gel incorporates bubbles which do not fully disperse resulting in foam formation on cooling and setting. We hypothesized that antifoaming agents might prevent this occurrence.
**Materials and methods:** We chose Polydimethylsiloxane (PDMS) a potent and widely used antifoaming agent for our study: Antifoam FDP (Bonneymans, Beith). The gels were prepared with 1:10 mono ethylene glycol /water to create ADAMgels (**A**queous **D**ietary fibre **A**ntifreeze **M**ix gel). Microwave heating and no techniques to prevent foaming were used.
First study (S1): We prepared one each of 8% gellan and psyllium ADAMgels with (tests) and without (controls) PDMS(FDP1:1000). These were then subjected to boiling for one minute and setting. All samples were then examined for consistency, foam formation and US image quality(USIQ).
Second study(S2): We then added PDMS(FDP1:1000) to both controls. All four specimens were remelted and boiled for one minute to ascertain the effect of adding PDMS to controls, and if any property changes caused by adding PDMS to tests were still present after recycling.
**Results and discussion:** There was no tangible difference in the consistency between samples within in each group in S1 and S2. Macroscopic foaming were observed in the controls, but not the tests in S1.This decreased in the controls (after adding PDMS) and increased in the tests in S2. These observations were reflected in the USIQ(fig 1).
**Conclusion:** These studies suggest that the antifoaming agent PDMS decreases the formation of foam in gellan and psyllium ADAMgels. This enhances USIQ, and makes the preparation of USRA phantoms easier.




*[Figure 1. Sonographs of Studies 1 and 2 comparing ADAMgel image quality Inserts showing pristine gels prepared without air entrapment needles in situ]*

## 03AP03-8

### Does high fidelity simulation training in ultrasound guided regional anaesthesia make it too difficult for novices?

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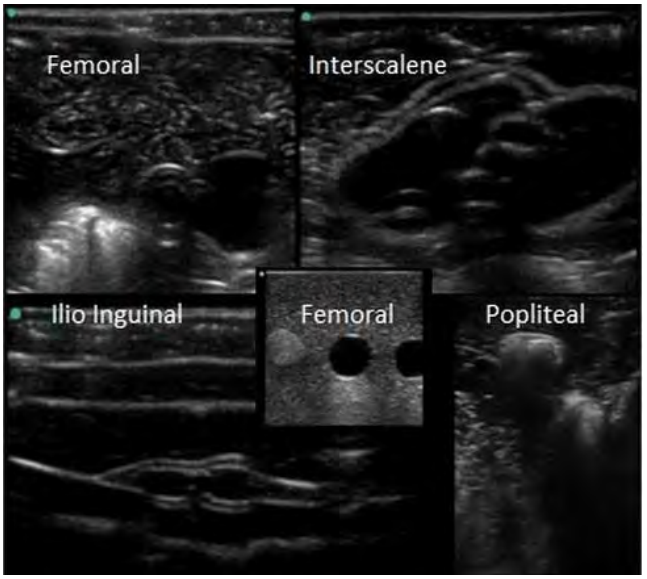
**Background and Goal of Study:** Advances in materials have made it possible to construct high fidelity simulation phantoms for ultrasound guided regional anaesthesia (USGRA). It was not known what detrimental effect greater realism and resultant increased difficulty might have on teaching these skills. We assessed this at an USGRA course using both advanced phantoms and commercial ones (Fig 1) and found this not to be the case. Users, classing themselves as experienced (n=5) or learners (n=9), responded positively (Likert scale responses >80%) . Two novices that attended gave more neutral responses ( <80% but > 60%). It was unclear whether this was due to the level of difficulty, small sample number or unwillingness to give opinions due to inexperience (nearly 50% responses neither agree/ disagree).[1] We therefore decided to test the hypothesis that increased difficulty associated with complex high fidelity USGRA phantoms could be counterproductive, and be detrimental to the learning process for novices.
**Material and methods:** We recruited an additional 9 novices to perform the same evaluation following exposure to an identical USGRA training process. Results were analysed in a similar manner.




*[Figure 1. High fidelity USGRA phantom sonographs Commercial phantom sonograph central insert]*

**Results and discussion:** The feedback from the larger sample novices group (9) was the same in all aspects as that of the 9 (more experienced) learners (average >80%). A minority of respondents at both levels of experience felt that more realistic models were distracting and preferred basic ones, with little difference between learners and novices. This could be indicative of individual preference for a modular method of skill training instead of a holistic approach.
**Conclusion:** There do not seem to be a negative effect caused by increased realism and difficulty associated with using complex high fidelity phantoms for training USGRA training in novices, thus disproving the hypothesis.
**Reference:**
1. Barnes L, Willers J, Rose, H, Birk, B, Goosen, L, Oosthuysen, S. Haptic realism in phantoms. A dream come true or a nightmare for learners in Ultrasound Guided Regional Anaesthesia? *Anaesthesia* 2015 70; **4**: 29

## 03AP03-9

### Neurostimulation vs. ultrasound guided interscalenic block for traumatic upper shoulder surgery - a prospective randomised trial assesing patient comfort and satisfaction

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**Background and Goal of Study:** Pain after trauma is the most common symptom report by patients. Specific protocols have been developed to treat pain in order to prevent posttramatic stress disorder. Ultrasound imaging has been shown to help perform various peripheral blocks by visualising the nerves and the adiacent anatomical structures and does not required electrical stimulation. Interscalenic plexus block is a common technique used for traumatic shoulder surgery.
**Materials and methods:** 112 patients ASA I-III undergoing shoulder surgery after a traumatic event, were prospectively enroled in 2 groups. They were randomly allocated to receive neurostimulated interscalenic block groupNS =56 patients and ultrasound guided interscalenic block groupUS=56 patients for shoulder surgery. Premedication included sufentanil 0.1mcg/bw. Additional propofol at patient request for more comfort 0.2-0.5mg/bw and a resque dose of sufentanil 0.05-0.1mcg/bw.
The comfort score used to evaluate patients satisfaction during interscalenic block performance include three criteria: maximal pain intensity using VAS score (0-100), the number of unpleasant events and patients satisfaction (unsatisfied, acceptable, satisfied, very satisfied). The comfort score was calculated as the sum of each criterion with atributed value of 0 or 1: VAS (<30/100, 1; >30/100, 0), number of unplesant events (0,1; >1,0) and satisfaction (satisfied and very satisfied, 1; acceptable or unsatisfied,0). Primary endpoint was patient comfort score. Secondary endpoints were time to perform the block, complications, success rate, aditional premedications.
**Results and discussion:** In the group NS 35% (21/56) were confortable respectively to 74% (42/56) in US group, $p<0.01$. Time to achive the interscalenic block was better in group US compared to group NS, $p<0.05$. Rescue preoperative medication was higher in group NS compared to group US, $p<0.01$. No statistical differeces were regardind succes rate and complications.
Preop medic propofol Gr. NS 20±5.2, Gr. US 8±2.4ş sufentanil 10±3.5 and 5±1.7 $P<0.01$
**Conclusion:** This study demonstrated that ultrasound technique is less painful and offer more comfort than neurostimulating method for traumatic upper arm injured patients. Electrical stimuli was considered the most unpleasant event.

## 03AP03-11

### Characterizing ultrasound-guided axillary brachial plexus block by definition of metrics and errors

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**Background and Goal of Study:** Change in the landscape of medical education coupled with the paradigm shift toward outcome-based training mandates the trainee to demonstrate specific pre-defined performance benchmarks to progress through training. Metric development is a pre-requisite for this process. The objective of this study was to characterize ultrasound-guided axillary brachial plexus block (USgAxBPB) by identification and definition of metrics and errors.
**Materials and methods:** With approval of the Institutional Ethics Committee, written informed consent was obtained from each participating subject. An Expert Group was established which composed of three expert regional anesthetists, an experimental psychologist and a trained facilitator. The Expert

Group deconstructed USgAxBPB to identify and define performance metrics. Experts reviewed five video recordings of the procedure performed by anesthetists of different levels of expertise to aid task analysis.Ten experienced regional anesthetists used a modified Delphi Panel method to reach consensus on the Metrics. Subsequently, the Expert Group identified and defined a set of potential errors.
Metrics and errors were subjected to "stress testing", a process to ascertain the ability to objectively score metrics and errors as occurring or not occurring.
**Results and discussion:** Fifty-four metrics organized in six operative phases and characterizing USgAxBPB were identified and defined. Based on the Delphi Panel consensus, one metric was modified, six deleted and three added. Thirty-two errors (with nine categorized as critical) were identified and defined. Face and Content validity were established.
Procedural skills play an important role in anesthetic practice. Evidence-based training and assessment of such skills will be needed in the future as training moves from an apprenticeship-based to competency-based training. We believe that a paradigm shift toward outcome-based training such as proficiency-based progression (PBP) training is underway. The task analysis stage we have described including metric development is a pre-requisite to development of i. a proficiency standard ii. a valid, reliable assessment tool and iii effective (PBP) training program.
**Conclusion:** In this study we have identified,defined and validated a bespoke set of metrics and errors relevant to USgAxBPB, which could form the basis of a truly evidence-based training program for this procedure in the future.

## 03AP03-12

### Ultrasound locating the epidural space: transverse median versus paramedian sagittal view

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**Introduction:** The aim of our study was to compare two ultrasound techniques lookout yellow ligament from the transverse median versus versus paramedian sagittal view.
**Materials and methods:** we conducted a randomized prospective study of 40 patients proposed for total knee replacement. They were randomized into two groups:
- GM: the identification of the yellow ligament is performed in the transverse median section.
- GP: we use the paramedian sagittal section.
for all patients, there is an ultrasound tracking and tranversal median sagittal space epidural puncture.
Then landmark in each group the ligamentum flavum and its depth is calculated relative to the skin. The epidural anesthesia procedure is thereafter performed according to the conventional technique of loss of resistance. We want the end of the procedure to measure, using the Tuohy trocar, the actual distance between the skin and the yellow ligament.
Statistical analysis was performed using SPSS software 22.T
**Results:** The age (years): GM :64.2 ± 8.4 in GM vs63.7 ± 9.6 in GP (p= 0.43) ; BMI(kg/m2) :25.8 ± 3.6in GM vs26.4 ± 2.9in GP (p=2,3);
The median sagittal identification (min): 0.86 ± 0.17in GM vs 0.84 ± 0.19 in GP (p=0.41); The median transverse locating(min):0.41 ± 0.12in GM vs 0.39 ± 0.14 in GP (p=0.37)
The identification of the yellow ligament (min) :2.03 ± 0.17in GM vs1.85 ± 0.13in GP (p = 0.019);
The duration of the procedure (min) 5.12 ± 0.9 4.93 ± 0.98 0.72;
The number of attempts 27/20 23/20 0.27;
The volume of 0.125% isobaric bupivacaïne (ml) 37.4 ± 4.6 35.6 ± 3.9 0.29;
The incidence of redirection of the needle:25/20in GM vs 1.15 23/20in GP (p=0.49).
Distance between skin and yellow ligament in GM (cm):4.85 ± 0.43 vs 5.16 ± 0.46 in GP (p=0,23).
The correlation between calculated and measured distance in GM (p of Pearson=0,84) and in GM (p=0,925).Student's test comparing the two differences averages is not statistically significant difference with p = 0.22 between GM and GP.
Onset time of sensory block(min): 18.6 ± 2.2in GM vs 17.4 ± 1.8 in GP(p=0.35);installation time of the motor block(min): 28.4 ± 7.4in GM vs 29.2 ± 8.6in GP(p=0.65); Dura breach:3 cases in Gm vs 1 case in GP (p=0.11);
The postoperative bleeding(ml) 483.8 ± 127.8 in GM vs 506.4 ± 145.9in GP (p=0.12);Satisfied patients 18/20in GMvs 19/20 in GP (p=0.83).
**Conclusion:** Ultrasound locating the epidural space, whether performed in the transverse median or paramedian sagittal cut is an easy technique to achieve with a low incidence of complications.

## 03AP04-1

### Spread of dye after single injection of transversus abdominis plane in adults: a cadaveric study

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**Background and Goal of Study:** The transversus abdominis plane (TAP) block is a technique used for analgesia after abdominal surgery in adults. However, data on optimal injected dose regimen and volume are limited.
The goal: to evaluate the character of dye spread in TAP, according to the volume injected.
**Materials and methods:** Research Ethics Committee approval for the study protocol was obtained.
The study was conducted on 15 fresh, unembalmed adult cadavers. Only subjects that cause of death was other than abdominal pathology were enrolled. Written informed consent was obtained from first-degree relatives or legal representatives of all subjects for dye injection and autopsy.
Cadavers were divided into three groups (5 per group), according to the amount of dye injected (10, 20 or 40 mL). Bilateral USG guided injections were performed. Injection point was in the mid axillary line in the space between costal margin and iliac crest.
After the dissection of the cadaver, the spread of the dye was assessed on both abdominal wall sides. The end points were the maximum length of dye spread in cephalo-caudal and medial-lateral direction. Statistics: one way ANOVA with Duncan posttest. Data are presented as mean and (95% CI).
**Results and discussion:** All 15 cadavers were examined bilaterally (30 samples, 10 per group). There were no issues in USG location of TAP. The dye was present in all samples.
Cephalo-caudal length of spread:
for (A) 40 mL - 12.8 (11.7 to 13.9) cm;
for (B) 20 mL - 11.8 (10.5 to 13.0) cm;
for (C) 10 mL - 6.2 (5.5 to 6.8) cm.
(A *vs.* B: p=0.109; A *vs.* C: p=0.00006; B *vs.* C: p=0.00014).
Medio-lateral length of spread:
for (D) 40 mL - 9.6 (8.1 to 10.9) cm;
for (E) 20 mL - 10.2 (8.9 to 11.5) cm;
for (F) 10 mL - 5.8 (5.1 to 6.4) cm.
(D *vs.* E: p=0.38; D *vs.* F: p=0.00015; E *vs.* F: p=0.000065).
**Conclusion(s):** There were no differences in the maximum length of cephalo-caudal and medio-lateral spread of the dye in the transversus abdominal plane after injection of a volume of 40 mL and 20 mL, but there were significant differences after a 10 mL injection.

## 03AP04-2

### Quantitative sensory changes induced by transversus abdominis plane block after ventral hernia repair: a prospective randomized study

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**Background and Goal of Study:** Transversus abdominis plane (TAP) block is an effective technique for pain management after abdominal surgery. So far, it is little known about quantitative sensory changes (QSC) induces by TAP block. The goal of this study was to assess QSC induced by TAP block after ventral hernia repair.
**Materials and methods:** Approval of Research Ethics Committee was received. Seventy (23 male) consecutive adult (>18 years), ASA 1-3 patients, without cognitive impairment were enrolled. Surgery performed under general balanced anesthesia (thiopental or propofol, fentanyl, sevoflurane, atracurium). Patients were randomly allocated to receive TAP block after induction in anesthesia (n=35) or systemic analgesic drugs - NSAIDs and morphine (n=35) for postoperative pain relief (reference group). The end points: pain intensity at rest and at movement; hypo- or hyperalgesia surface and width (from incision edge). Statistics: t-Student. Data are presented as mean (95%CI).
**Results and discussion:** There were no differences in demographic characteristics and preoperative QST results.
VAS score was lower in case vs control group:
at rest 0h, 3h, 6h, 12h, 24h - 10.7 (95%CI, 5.6 - 15.8), 12.82 (95%CI, 8.8 - 16.8), 12.3 (95%CI, 8.3 - 16.3), 12.3 (95%CI, 8.45 - 16.2), 12.5 (95%CI, 8.5 - 16.5) vs 44.0 (95%CI, 35 -53), 41 (95%CI, 32 -50), 35 (95%CI, 28 - 42), 35.7 (95%CI, 29 - 42.5), 31 (95%CI, 23.7 - 39), p<0.000001.
At movement 0h, 3h, 6h, 12h, 24h - 19.6 (95%CI, 14.2-24.9), 22.5 (95%CI, 17.7 -27.4), 21.8 (95%CI, 17.4 - 66.3), 22.4 (95%CI, 19.5 - 25.4), 21.8 (95%CI,17.9 - 25.8) vs
53 (95%CI, 44 - 63), 51 (95%CI, 43 -60), 45 (95%CI, 37 - 53), 45 (95%CI, 38 - 52), 37 (95%CI, 29 - 46), p<0.000001.
Hypoalgesia surface, $cm^2$ (attested in TAP group only): D0 - 766 (684 to 867); D1 - 597 (514 to 680). Hyperalgesia surface, $cm^2$ (attested in reference group only): D0 - 541 (486 to 569); D1 - 492
(432 to 596). Maximal width (mm) of QSC: D0 - 34 (32 to 36) vs. 27 (25 to 29); D1 - 29 (26 to 31)
vs. 25 (23 to 27), TAP vs. reference group, respectively.
**Conclusion(s):** TAP significantly reduces pain intensity 24h postoperatively (both, at rest and at movement), compared with balanced analgesia. Hyperalgesia was found only in reference group.

## 03AP04-3

### The pectoral block for the treatment of postoperative pain after breast cancer surgery: a prospective, randomised, controlled trial, PECBLOC

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**Background and Goal of Study:** Chronic pain after breast surgery is common, therefore, adequate pain control in the postoperative period is essential. General anaesthesia is often associated with a regional technique for breast surgery and consists of thoracic epidural, paravertebral block and the recently described pectoral nerve block (PNB).
The first two are not indicated in ambulatory surgery, thus, we decided to evaluate the effectiveness of the PNB in the treatment of postoperative pain after breast cancer surgery.
**Materials and methods:** After ethics approval, a prospective, randomised, double blind, controlled trial was performed in two university hospitals (Limoges and Montreal) between January 2014 and May 2015 (Clinicaltrials.gov: NCT01670448).
Patients (18-75 yr-old) scheduled for unilateral breast cancer surgery under general anaesthesia were recruited, but not those with breast or chronic pain before surgery, metastases or scheduled for breast reconstruction surgery.
An echoguided PNB was performed with 0,4 mL/kg of either bupivacaine 0.25% with adrenaline 1:200 000 or NaCl 0.9% administered between the pectoral muscles at mid-subclavicular level.
The primary outcome was pain (verbal numerical rating scale 0-10) in the recovery unit 30 min after admission or when analgesia was requested (pain score > 3/10).
Secondary outcome measures were sufentanil consumption (μg) perioperatively and total morphine consumption (mg) in the recovery unit and at 24 h after surgery. $P$ <0.05 was considered significant. 128 patients were needed. Results are expressed as median [25-75%].
**Results and discussion:** Pain scores and morphine consumption in the recovery were not different between the 2 groups: 3 [1-4] and 3 [1-5], and 1.5 [0-6] and 3 [0-6] for the bupivacaine (n=62) and placebo (n=65) groups, respectively. However, for patients who underwent major surgery (n = 29; mastectomies or tumorectomies with axillary clearance) pain scores and morphine consumption were statistically different, 3 [0-4] and 4 [2-5] ($P$ = 0.04), and 1.5 [0-6] and 6 [0-12] ($P$ = 0.016), respectively. Sufentanil peroperatively and morphine consumption at 24 h were not different between the 2 groups.
**Conclusion(s):** The PNB is not necessary for minor breast cancer surgery, however, for major surgery it significantly decreases postoperative pain and morphine consumption in the recovery.

## 03AP04-4

### Paravertebral block and TAP block for perioperative pain relief in kidney donors undergoing open nephrectomy: a randomized controlled trial

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**Background and Goal of Study:** Perioperative pain is a major concern in healthy kidney donors, affecting their daily activities. So every effort should be made to relieve this discomfort. Thus a prospective, randomized, controlled, participant blinded trial was designed to compare the efficacy of Paravertebral Block and TAP Block for perioperative pain relief in adults undergoing open donor nephrectomy under GA.
**Materials and methods:** 60 kidney donors of ASA Grade I-II, between 18-65 years, were divided into three groups of 20 each, depending upon the intervention performed.
(I) PVB group (Paravertebral Block) - patients received preinduction 5 mL of 0.5% ropivacaine, each at $T_8$, $T_9$, $T_{10}$, $T_{11}$, $T_{12}$ paravertebral spaces.
(II) TAPB (Transverse Abdominis Plane Block) - patients received 25 ml of 0.5% ropivacaine using USG guided subcostal and classic approach.
(III) Control group patients received intravenous analgesia only.
All patients received general anaesthesia and PCA fentanyl and rescue morphine postoperatively. Intraoperative fentanyl consumption, postoperative pain assessment using VAS at rest and movement at 0, 2, 6, 12, and 24 hours, time to first analgesic requirement in PACU, and postoperative opioid consumption were noted.
**Results:** On evaluation, it was observed that, when compared to TAPB and control groups, PVB group patients had significantly
**(i)** lower intraoperative fentanyl requirement (P<0.001),
**(ii)** lower VAS scores on rest and movement (0, 2, 6, 12, 24 hours), (P<0.001),
**(iii)** longer time to first postoperative analgesic requirement, (P<0.001),
**(iv)** lower postoperative opioid consumption, (P<0.001).
**Conclusion:** Unilateral PVB block provided better perioperative analgesia compared to unilateral TAPB for open donor nephrectomy.

## 03AP04-5

### Effect of TAP block (tranversus abdominus planus) versus local anaesthetic infiltration on pain relief in transfemoral transcatheter aortic valve implantation (tTAVI)

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**Background and Goal of Study:** Transfemoral TAVI has traditionally been undertaken with general anaesthesia however recently has seen a move towards the use of local anaesthetic (LA). LA has been shown to be as safe and effective as GA in tTAVI[1]. This audit aimed to evaluate the intra and postoperative analgesic effect of TAP block, a peripheral nerve block, in patients undergoing tTAVI.
**Materials and methods:** The study was conducted at St Barts Heart Centre on patients scheduled for elective tTAVI where no sedation was used and no surgical access or vascular complications present.
Patients were allocated equally into
1. Control group with local infiltration of groin and
2. TAP block group, both using10ml Lidocaine 2% + 20ml L-Bupivacaine 0,25% and guided by ultrasound.
Patients were asked to rate pain on a scale from 1 to 10 pre, intra and post operatively.
A student unpaired T test was used to calculate p values.
**Results and discussion:** Ten patients were included, five in each arm. Mean age in control group was 82.2 and in TAP group 80.2. Mean duration of procedure in control group was 64.6mins and in TAP group 62.4mins. Pain prior to TAVI was 0 in all patients in both groups. Intra operatively in control group mean pain score 1.6, range [1-2] and in the TAP group mean pain score 3.4, range [2 - 6] no statistical significance between the two groups was found; p value 0.0516 CI 95% (-3.62 to 0.02 ).
Post operatively in the control group mean pain score was 1.2, range [1-2] and in the TAP group mean pain score was 0, range [0-0] demonstrating a statistically significant improvement in pain relief post operatively in the TAP group; p value 0.0125 CI 95% (-2.06 to -0.34).
TAP block provided effective pain relief for patients undergoing tTAVI and showed an improvement in post-operative pain relief in comparison to LA.
**Conclusion:** TAP block may offer effective intra and postoperative pain relief for patients undergoing tTAVI. Further studies are needed to fully evaluate its effect and safety.
**Reference:**
1. Chopard R, Meneveau N, Chocron S, et al. Safety and efficacy of Local versus General anesthesia in patients undergoing transcatheter aortic valve implantation using a transfemoral approach; VARC-defined outcomes in the France 2 Registry. *J Am Coll Cardiol.* 2014;63(12_S)

## 03AP04-6

### Subcostal transversus abdominis plane block significantly reduces pain after laparoscopic cholecystectomy

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**Background and Goal of Study:** After laparoscopic cholecystectomy, patients have moderate pain in the early postoperative period. Some studies shown benefitial efects of transversus subcostal abdominis plane (STAP) block on reducing this pain.Our goal was to investigate influence of subcostal TAP block on postoperative pain scores and opioid consumption.
**Materials and methods:** We have randomized 64 patients undergoing laparoscopic cholecystectomy in Clinical centre of Vojvodina to receive either subcostal transversus abdominis block (n=32) or standard postoperative analgesic care (n=32). First group received subcostal bilateral ultrasound guided STAP block with 20ml of 0.33% bupivacain per side before operation and tramadol 1mg/kg i.v for pain breakthrough (≥6). Second group received after operation tramadol 1mg/kg/6h as standard postoperative analgesia. Both groups received acetaminophen 1g/8h i.v and metamisol-Na 2.5g/12h. Pain at rest was recorded for each patient using NR scale(0-10) at time 10 min, 30 min, 2h, 4h, 8h,12h and 16h after the surgery was completed.
**Results and discussion:** We obtained no statistically significant difference between groups according age (p=0.40), weight (p=0.57) and duration of surgery (p=0.26). STAP block significantly reduced postoperative pain scores (NRS) compared to standard analgesia after 10 minutes (2.68 ± 2.01 vs 5.1 ± 2.36 p=0.000) , 30 minutes (2.93 ± 1.55 vs 5.03 ± 2.02 p=0.000), 2h (3.10 ±1.81vs 4.41 ± 1.54 p=0.005), 4h (2.20 ± 1.23 vs 4.06 ± 1.41 p=0.000), 8h (2.06 ± 1.41vs 3.31 ± 1.62 p=0.003), 12h (1.55 ± 1.35 vs 2.65 ± 1.44 p=0.002) and 16h (1.27 ± 1.19 vs 2.37 ± 1.36 p=0.002). Tramadol consumption (g) was significantly lower in the STAP group 24.2 ± 49.3 than in the standard analgesia group 260 ± 91.9 (p=0.000).
**Conclusion(s):** Our results show that subcostal TAP block can provide superior postoperative analgesia and reduction in opioid requirement after laparoscopic cholecystectomy.
**Reference:**
1. Tolchard S, Davies R, Martindale S. Efficacy of the subcostal transversus abdominis plane block in laparoscopic cholecystectomy: Comparison with conventional port-site infiltration. J Anaesthesiol Clin Pharmacol. 2012 Jul-Sep; 28(3): 339-343.

## 03AP04-8

### Echoguided transversus abdominis plane block: an effective option in hernioplasty surgery

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**Background and Goal of Study:** The Echoguided Transversus Abdominis Plane (TAP) Block is a simple and safe technique and could increase the rate of succes to blocking the abdominal wall neural afferents in unilateral groin hernioplasty. The TAP block can be an useful analgesic method during and after unilateral hernioplasty (UH). And allows an early discharge in ambulatory surgery.
This prospective, randomized, blinded study was designed to compared TAP block versus Remifentanyl both of them with intravenous general anesthesia (IGA). Intra and postoperative analgesic efficacy in patients undergoing UH was measured.
**Materials and methods:** 20 patients undergoing HS received standar IGA with laringeal mask (Igel®) and propofol infussion, the patients were randomized either with TAP block (Group A n=10) or without TAP block (Group B n=10). Inclusion criteria were age (>18 years old), ASA physical status 1-2. The patients were excluded if there was a history of local anesthesics allergy, a coagulation disorder and infection at the needle insertion site. Group A: TAP block with 20 ml (0.25% isobar bupivacaine and 1% mepivacaine). Group B: Infusion of remifentanyl (0.1-0.3 mcg/Kg/min). Both groups received preemptive analgesia with NSAID (Dexketoprofen 1mg/kg). The visual analogic scale was recorded 12 hrs. after surgery, postoperative complicacions and satisfaction at discharge.
**Results and discussion:** There were no differences in demographics in both groups and the surgical time. The TAP block significantly reduces the the IO use of remifentanyl (p=0.036). The pain score (average EVA) after surgery was lower in group A (4±0,29 vs 6±0,33).
The postoperative analgesic requirement was lower in group A. TAP block reduced significantly (p=0.04) nausea and vomiting. The group A had an early discharge (hour hospital length stay 10.33 vs 16.40). Satisfaction surveys were not differents (p=0.07).
**Conclusion(s):** The TAP block is useful as an analgesic method in unilateral groin surgery. It reduces the opioids drugs and postoperative complications. The TAP block allows an early discharge.

## 03AP04-10

### Comparison of the effectiveness of the ilioinguinal-iliohypogastric block and the transversus abdominis plane block for analgesia after unilateral inguinal hernia repair

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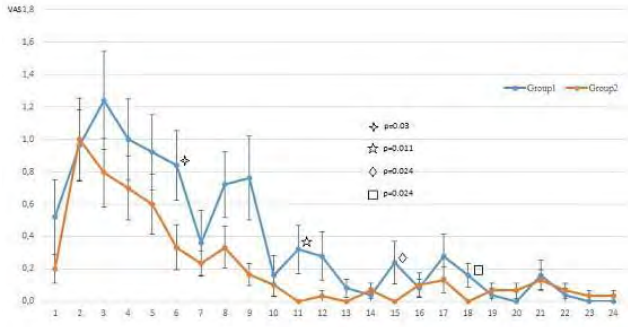
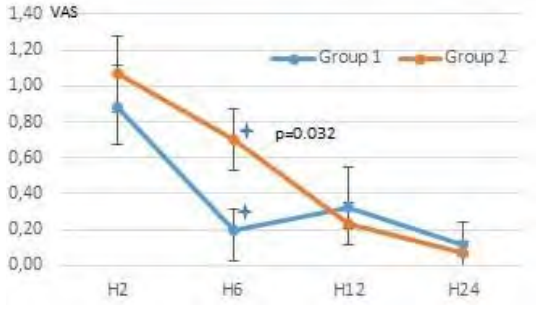
**Background and Goal of Study:** Ilioinguinal-iliohypogastric block (II/IH) and TAP block were regional block techniques that provides effective analgesia after some abdominal surgery.
In this study, we compared the analgesic efficacy of the ultrasound (US) guided II/IH block and TAP block for analgesia after unilateral inguinal hernia repair.
**Materials and methods:** We conducted a prospective double-blinded randomized study. Sixty patients aged between 20 and 60 years, belonging to ASA I-II scheduled for unilateral hernia repair were randomly allocated into 2 groups: TAP block (Group1, n=30); and II/IH block (Group2, n=30). Unilateral US block was performed with 30 ml 0.125% bupivacaine after induction of a standardized general anaesthesia. A postoperative analgesic regimen was used consisting of morphine Patients controlled Analgesia and paracetamol 500mg PO every 6 h. The primary endpoint was the morphine consumption in the 24 h postoperatively. Visual Analog Scale 0-10 (VAS) pain score (while moving and at rest), the cumulative opioid consumption every hour, the time for first bolus of opioid, the quality of recovery questionnaire (QOR-9) were the secondary endpoint.
**Results and discussion:** The total amount of 24-hour morphine consumption was significantly higher in Group1 (9.16 mg ± 1.61) than group2 (5.07 mg ± 1.06) p=0.034.The amount of opioid consumption at six, 11, 15 and 18 hours postoperatively was significantly higher in Group1 (Graph1). VAS pain scores at rest were significantly lower in Group1 at 6 hours postoperatively (Graph 2). There were no between-group diffrences in QOR-9 and in the time for first bolus of opioid.




*[Hourly Morphine Consumption]*




*[Postoperative VAS pain scores at rest]*

**Conclusion(s):** II/IH and TAP block are both effective in controlling postoperative pain after unilateral hernia repair. The II/IH block has the advantage of less dose of opioid requirement in the 24h postoperatively.

## 03AP04-12

### Review of paravertebral regional techniques utilised for thoracic surgery in a tertiary cardiothoracic centre

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**Background:** There is a wide spectrum of analgesic techniques utilised for thoracic surgery which is dependent on patient profile and influenced by anaesthetic and surgical preference or skill mix.[1]
Our objective was to compare ultrasound(USS) guided paravertebral(PVB) to landmark guided PVB in video-assisted thoracoscopy (VAT) and thoracotomy procedures in our unit.
**Methods:** Data was collected over a 4 week period in November 2014. We looked at the type surgery performed, intraoperative and post-operative analgesia usage and type of regional technique performed. Peri-operative data was collected prospectively by the primary anaesthetist and recovery nurse. Post-operative analgesia usage was collected retrospectively through the hospital's electronic documentation system.
**Results:** There were 33 cases in total. 23 VAT procedures and 10 thoracotomies with 14 receiving USS guided PVB block and 19 receiving landmark PVB block. Mean duration for block performance was 7.5(±3.7) minutes (USS) and 6.6(±2.9) minutes (landmark). Mean morphine consumption in first 24 hours post surgery was 25.7(±19.6) mg (USS) and 44.7(±25.0) mg(landmark). There were 2 complications
(2 pleural tap) associated with landmark PVB block.

| | Ultrasound guided PVB block | | Landmark PVB block | |
|---|---|---|---|---|
| | Value | Standard Deviation | Value | Standard Deviation |
| **No. of Patients** | 14 | | 19 | |
| **Mean Duration (minutes)** | 7.5 | ±3.7 | 6.6 | ±2.9 |
| **Mean Morphine Consumption in First 24 hrs (miligrams)** | 25.7 | ±19.6 | 44.7 | ±25.0 |
| **Complications** | 0 | | 2 pleural taps | |

*[Comparison of Paravertebral Regional Anaesthesia]*

**Conclusion:** Mean morphine consumption was lower in the USS guided PVB group and rates of complication were higher in landmark PVB group. This was a snapshot audit of our practice and sample size was small, we conclude that USS guided PVB block is an alternative to landmark PVB block with similar duration of procedure. There is limited comparison literature[2] but we feel that USS guided technique in experienced hands and under direct vision would reliably position a needle in the PVB space and hence be safer and improve block success rates. This will help justify a randomized study of USS guided PVB block versus landmark PVB block in patients undergoing thoracic surgery.
**References:**
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## 03AP05-1

### Lidocaine-prilocaine cream to reduce the pain of skin puncture for locoregional anaesthesia

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**Background and Goal of Study:** The improvement in locoregional anesthesia particularly with ultrasound techniques has not solved the problem of pain and discomfort during the puncture of an axillary brachial block (AB). Several studies have shown the benefits of the application of lidocaine-prilocaine cream (LPC) for skin punctures such as IV catheter insertion. The aim of this study was to assess the efficacy of LPC for dermal analgesia when placed at the puncture site for an AB.
**Materials and methods:** The prospective, single-center, controlled, randomized, double-blinded versus placebo study was conducted after agreement of local ethic committee (No. 12.05.13) from August, 2012 to January, 2014 at the University Hospital of Poitiers. Eighty-four patients receiving AB for upper limb surgery were included after informed consent. Patients were randomized into 2 groups: LPC group (n = 42) with application of 10 g of LPC on puncture site of the AB, and one placebo group (n = 42) with application of 10 g of placebo cream on puncture site of the AB. The pain during the puncture and the pain while injecting anesthetics were evaluated with 100 mm visual analogic scale. Results are presented as mean ± standard deviation.
**Results and discussion:** Demographic data were comparable between the LPC group vs. Placebo group (mean age 51.1 ± 14.3 years vs. 50.3 ± 16.6 years; BMI 26.7 ± 5.3 kg/m2 vs. 25.6 ± 4.0 kg/m2; female ratio/male 1.7 vs. 1.6, ASA status similar). The cream in the LPC group was applied for
70 ± 45 min vs. 75 ± 43 min in the placebo group; p = 0.67. The pain during the puncture of AB was significantly lower in LPC group compared to placebo group (14.8 ± 12.9 mm vs. 27.0 ± 17.2 mm;
p = 0.007). The pain during injection of local anesthetic was not different between LPC and placebo groups (26.7 ± 19.7 mm vs. 28.5 ± 16.5 mm; p = 0.36).
**Conclusion(s):** Lidocaine-prilocaine cream is a simple way to help reduce pain of skin puncture in locoregional anaesthesia. This strategy may be part of improving the management of pain and patient comfort at the operating room.

## 03AP05-2

### Impact of adding adrenaline to local anaesthetics on various types of peripheral anaesthesia: a meta-analysis of randomised trials

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**Background and Goals of Study:** Adrenaline is used as an adjuvant to local anaesthetics (LA) for regional anaesthesia. Impact of this adjunction remains poorly characterised. This systematic review aims to quantify the impact of adding adrenaline to a LA for epidural and intrathecal anaesthesia, and peripheral nerve or plexus blocks. (PROSPERO 2015: CRD42015026148)
**Materials and methods:** We searched CENTRAL, EMBASE, Google Scholar and PubMed (no language restriction) to October 2015 for all randomised trials comparing any regimen of any LA combined with any regimen of adrenaline (experimental intervention), with the same LA regimen without adrenaline (control intervention). Trials testing LA infiltration (for instance, subcutaneously) were not considered. Trials in which an additional adjuvant was used (for example, an opioid or clonidine) were considered if the same regimen of the adjuvant was used in both groups. For inclusion, a trial had to report on the duration of analgesia or anaesthesia, LA consumption, or adverse effects. Reports were not considered if adrenaline was added to regional anaesthesia in absence of a LA.
**Results and discussion:** We identified 70 randomised trials (3750 patients): 39 trials (2001 patients) for epidural anaesthesia, 25 (1543) for intrathecal anaesthesia, and six (206) for peripheral nerve or plexus blocks. Adrenaline increased the duration of analgesia of epidural anaesthesia (weighted mean difference [WMD] 17 minutes, 95% confidence interval [CI] 14 to 21), of spinal anaesthesia (WMD 29 minutes [24 to 33]), and of peripheral nerve and plexus blocks (WMD 64 minutes [95%CI 47 to 81]). The duration of motor block was only prolonged in spinal anaesthesia (WMD 74 minutes [95%CI 46 to 102]). Adrenaline improved the VAS pain score up to 6h when added to epidural and intrathecal LA (WMD -0.56 [95%CI -1.01 to -0.11]). LA consumption was reported in a variety of ways and could therefore not be quantified. There was no evidence of an impact of adrenaline on the incidences of PONV, sedation, urinary retention, pruritus, bradycardia or hypotension, or on the incidence of caesarean section or instrumentation for delivery, umbilical arterial pH, or foetal bradycardia.
**Conclusions:** Adding adrenaline to LA increases the duration in all types of regional anaesthesia, prolongs block in spinal anaesthesia and decreases early pain scores in neuraxial anaesthesia, without increasing the incidence of adverse effects.

## 03AP05-3

### Addition of Exparel® to Bupivacaine Hydrochloride results in similar early block characteristics but significantly longer analgesia in patients with rotator cuff repair

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**Background and Goal of Study:** A recent introduction of liposomal bupivacaine 1,3% (Exparel®) in the clinical practice of regional anesthesia in the USA represents a major pharmacological advance. Several studies have documented the analgesic benefit of Exparel® [1],[2],[3]. In this study we tested the hypothesis that addition of Exparel® to Bupivacaine Hydrochloride (Bupi HCl) results in similar early block characteristics, but longer duration of analgesia than Bupi HCl alone.
**Materials and methods:** After local ethics committee and Belgian NDA approval (ClinicalTrials.gov NCT02554357), forty subjects are being randomized to receive the interscalene brachial plexus block (ISB) with either only 15 ml Bupi HCl 0.25% or 5 ml Bupi HCl 0.25% followed by 10 ml Exparel® under ultrasound guidance. The main outcome variable was postoperative pain. All patients received general anesthesia for surgery and were assessed by a blinded observer up to one week postoperatively.
**Results and discussion:** As part of a data entry check, a preliminary analysis of NRS pain scores was conducted on Exparel® (n = 9) and Bupi Hcl (n = 8) patients. For pain at rest and with movement at 36 h, 48 h, 60 h, 72 h, 84 h, 96 h, and 7 d, pain scores were consistently lower for Exparel® by approximately 1-2 points. When pain was dichotomized at 3 (0-3 *v* 4-10), Fisher's exact p-values suggested that differences would be most evident from 48-60 h onward. Sensory blockade was stronger in the Bupi HCl group than in the experimental group at 30 min (3.4 *v* 6.0, respectively, p = 0.09); however, there was no difference in sensory blockade between the groups at 1 h postoperatively (3.9 *v* 4.6, respectively, ns). None of the patients had any signs or symptoms of shortness of breath (phrenic paralysis), local anesthetic toxicity or prolonged motor blockade. None of the patients developed prolonged motor blockade that interfered with activities.
**Conclusion(s):** An interim analysis of our study suggests that addition of Exparel® to Bupi HCl results in similar early block characteristics but significantly longer duration of analgesia than Bupi HCl alone.
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## 03AP05-4

### Magnesium sulfate as an additive to bupivacaine in supraclavicular blockade in upper limb vascular surgery

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**Background and Goal of Study:** Evaluating the effect of magnesium addition to Bupivacaine for supraclavicuar brachial plexus blockade. The primary endpoints were the onset and total duration of sensory and motor block, secondery endpoints were the qualityand duration of postoperative analgesia.
**Materials and methods:** After local committee approval 60 patients aged between 20 and 60 years old were randomly allocated in to two equal groups in a double-blinded fashion both the anaethetist and the patiend were blind to the given drugs . In group 1 (n=30), 30ml bupivacaine0.5% and in group 2 (n=30), 28ml bupivacaine0.5% +2ml magnesium (200mg) were given. Motor and sensory block onset times and the block durations were recorded by the anaethetist. the quality and duration of postoperative analgesia were recorded by a blind PACU nurse. VAS score more than three manaeged with 15 mg paracetamol while score more than six managed with fentanyle patch 25 microgram.
**Patient preparation:**
1. Written consent
2. Cagulation profile
3. Intravenous line
4. Emergency resuscitation equipment.
5. Inclusion criteria:
· Adult undergoing vascular surgery ASA I - III
6. Exclusion Criteria:
· Contraindications to regional block
· Bilateral limb surgery
· Alterd conscious level
· Pregnancy
· BMI >35
· Preexisting neuropathy involving the surgical limb
· Patients who have difficulty understanding the study protocol
· patients who have any known contraindication to study medication.
**Results and discussion:** Statistical analysis done by SPSS version 16.0 using Mann-Whitney test No significant difference in the demographic data and surgical characteristics in the both groups. No significant difference in the onset of motor block in both groups (13.10 ± 3.34 vs 12.75 ± 3.43) P value <0.05 The sensory block onset time in minutes was earlier in group 2 as compared to group 1 (16.00 ± 3.48 vs 12.70 ± 2.92) P value <0.05. Duration of motor blockade in minutes were longer in group 2 than in group 1, (136.50 ± 28.34 vs 214.50 ± 36.92) P<0.05. Duration of analgesia in minutes was longer in group 2 than in group 1, (313.50 ± 103.68 vs 558.00 ± 48.08) P<0.05. The 24 hour Visual Analog Scale was more in group 1 as compared to group 2.
**Conclusions:** Magneseium sulfate addition to local anaethetics for supraclavicular brachial plexus block has no effect on the onset of motor blockade but it prolongs the duration of both sensory and motor block, quality and duration of postoperative analgesia.

## 03AP05-5

### Midazolam versus neostigmine as adjuvants to bupivacaine in ultrasound guided supraclavicular brachial plexus block: relationship to 8-epi-prostaglandin F2 alpha and inflammatory biomarkers

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**Background and Goal of Study:** Brachial plexus block is a practical surrogate to general anaesthesia. Postoperative analgesia is an added benefit. Comparing the efficacy of midazolam and neostigmine addition to bupivacaine in supraclavicular brachial plexus block as regard the onset and duration of sensory and motor block and duration of analgesia.
**Materials and methods:** A prospective, randomized, study was done at Assuit university Hospital. Ninety adult patients ASA I,II and III ,aged between 18-65 years and scheduled for various upper limb surgeries except shoulder surgeries under ultrasound guided supraclavicular blockade. Patients were divided into three groups 30 each. In group 1 (n=30), 30ml bupivacaine0.5% and in group 2 (n=30), 28ml bupivacaine0.5% + 2 ml midazolam (50 mic/kg) and group 3 (n=30), 28 ml bupivacaine + 2 ml neostigmine (200mic). Biochemical indices such serum human 8-epi-prostaglandin F2alph (8-epi PGF2),serum cortisol, Interleukin 6 &8 were measured using ELISA. As well as Plasma vitamin C concentrations were determined by HPLC. Hemodynamic variables, oxygen saturation as well as pain scores, sedation scores,motor and sensory block, onset times, block durations were measured.
**Results and discussion:** No significant difference in the demographic data and surgical characteristics in the three groups. The onset and duration of sensory and motor block was significantly faster and longer in group 2 compared to other groups (p<0.001). Pain score and requirement of salvage analgesia were significantly lower in group 1 compared to the other groups. Serum levels of 8-epi PGF2, cortisol,Interleukin 6 &8 and plasma vitamin C concentrations showed no significant difference in three groups preoperatively. Postoperatively, there were significant lower levels of serum 8-epi PGF2, cortisol ,interleukin-8 and plasma Vit C in group 2 compared to group 1(p<0.001) and group 3(p<0.01) respectively. However Interleukin 6 showed no significant difference.
**Conclusions:** Addition of midazolam or neostigmine to bupivacaine for supraclavicular brachial plexus block prolonged sensory blockade and post-operative analgesia without rising the danger of unsympathetic effects ,delayed time to first analgesic use and decreases total analgesic requirments without side-effects. In addition the use of ultrasound guidance brachial plexus block presented a significant suppression of several biochemical indices.

## 03AP05-6

### Effect of intra-articular alpha-agonists on post-operative outcomes following arthroscopic knee surgery: a systematic review and meta-analysis

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**Background and Goal of Study:** Arthroscopic knee surgery is associated with significant post-operative pain. Intra-articular (IA) infiltration of local anaesthetics (LA) may prolong the duration of analgesia, and there has been extensive investigation into the addition of adjuncts to improve the efficacy of block. The intra-articular alpha-agonists clonidine and dexmedetomidine have been shown to prolong the duration of action of analgesia, but the evidence is limited. The objectives of this systematic review and meta-analysis were to review the available evidence and evaluate the analgesic effect of addition of alpha-agonists to LA when used for arthroscopic knee surgery.
**Materials and methods:** PubMed, EMBASE, Cochrane Library, Google Scholar, conference abstracts and bibliographic references were searched for RCTs comparing IA LA to IA LA+ adjuvant, in arthroscopic knee surgery. The data were analysed using RevMan software. The primary outcome was the duration of analgesia, as determined by the time to first request for additional analgesia in the post-operative period. Secondary outcomes were pain intensity, total opiate consumption over 24 hours and incidence of cardiovascular disturbance.
**Results and discussion:** Seven trials (320 patients) were included in the meta-analysis. Alpha-agonists significantly prolonged the duration of action of LA [SMD 2.60 [95% CI, 2.24 to 2.96]
(p<0.00001)]. VAS scores at rest were significantly lower at two hours (SMD -0.83 [95% CI, -1.22, -0.44] (p<0.0001)] when alpha-agonists were used. Furthermore, total opiate consumption was reduced in the experimental group (SMD -1.78 [95% CI, -2.48, -1.09] (p<0.00001)]. Adverse effects were minimal with no significant differences seen between groups.
**Conclusion(s):** Intra-articular infiltration of alpha-agonists with LA significantly prolongs duration of analgesia and reduces pain intensity following arthroscopic knee surgery.

## 03AP05-7

### Does clonidine have a perineural mechanism of action, when used as an adjuvant to ropivacaine - a paired, blinded, randomized trial in healthy volunteers

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**Background and Goal of Study:** The addition of clonidine to ropivacaine has been shown to prolong the duration of peripheral nerve blocks. The mechanism of action remains unclear. We hypothesized, that clonidine used as an adjunct to ropivacaine extends the duration of an adductor canal block by a peripheral mechanism, compared to ropivacaine alone.
**Materials and method:** We conducted a paired, blinded, randomized trial in healthy male volunteers. Each participant received bilateral adductor canal block containing 20ml ropivacaine 0.5% + 1 ml clonidine 150$\mu$g/ml in one leg and 20ml ropivacaine 0.5% + 1 ml saline in the other leg in a randomized, blinded fashion. The primary outcome measure was duration of sensory block assessed with ability to discriminate temperature (alcohol swab). Secondary outcome measures were duration of sensory block assessed by: pinprick, maximum pain during tonic heat stimulation, warmth detection threshold and heat pain detection threshold. The latter three sensory modalities were measured using the Modular Sensory Analyzer Thermal Stimulator (2.5 cm$^2$, Thermotest, Somedic A/B, Hörby, Sweden). We performed an intention to treat analysis using a paired T-test.
**Results and discussion:** We enrolled 21 volunteers and all completed the trial. There was no significant difference in duration of sensory block assessed with an alcohol swab: Mean duration in the leg receiving ropivacaine + clonidine was 19.4h (95% CI: 18.2-20.6) compared to 19.3h (95% CI: 18.2-20.4) in the leg receiving ropivacaine + placebo with a mean difference of 0.1h (95% CI: -1.0 to 1.3), P= 0.83. Nor were there statistical significant differences in block duration when assessed by: pinprick, maximum pain during tonic heat stimulation, warmth detection threshold or heat pain detection threshold.
The prolonging effect of adding clonidine to ropivacaine found in other studies may be caused by absorption of the perineural administered clonidine and consequently a systemic effect. The main strength of our study is that we were able to control for any systemic contribution of clonidine, which would have equally affected both blocks in this bilateral model. The main limitation of our trial is that we are unable to determine whether there is a systemic effect, and if so the magnitude of this effect.
**Conclusion(s):** Clonidine used as an adjunct to ropivacaine does not prolong the duration of an adductor canal block by a peripheral mechanism.

## 03AP05-8

### Effects of Ketamine added to Marcaine for spinal anaesthesia

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**Background and Goal of Study:** The evaluation of bennefits in adding Ketamine to Marcaine in spinal anaesthesia concerning hemodynamic stability, spinal block onset time, quality of sensitive and motor block, frequency of side effects, duration of postoperative analgesia.
**Materials and methods:** After obtaining approval from our Institutional Ethics Committee and informed patient consent, we performed a randomised, prospective, double-blind study on 30 patients with inguinal hernia who needed surgery under spinal anaesthesia. Patients were randomly allocated in 2 groups: group B - 15 patients recieved hyperbaric marcaine 0,5% 0,2 mg/kg and group K - 15 patients recieved hyperbaric marcaine 0,1 mg/kg plus ketamine 1 mg/kg. We registered patients data, hemodynamic variables, SpO2, sensitive block onset time, duration and quality of sensitive and motor block (Bromage score), side effects, duration and quality of postoperative analgesia.
**Results and discussion:** A significant decrease of MAP and pulse rate was observed on patients in group B, 46,7% received ephedrine and 6,7% atropine to reestablish the blood pressure and heart rate. The duration of sensitive block in group K was longer 245,07±27,76 min, compared to group B 150,13±13,06 (p=0.006). The postoperative analgesia was significantly increased in group K (40% received ketorol and 6,7% ketorol+mialgin) compared to group B (86,7% received ketorol+mialgin and 13,3% ketorol). Intraoperative and postoperative Bromage score in group B was higher 3,87±0,51 compared to group K 3,20±0,56. We also observed a decrease of intraoperative shiver in group K 13% compared to group B 40%.
**Conclusion(s):** Adding Ketamine to Marcaine in spinal anaesthesia led to a longer
sensitive block and better management of postoperative pain, decreasing the requirement of analgetics. A decrease of motor blockage and a significantly better hemodynamic stability was achieved.
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## 03AP05-9

### Dose optimization of dexmedetomidine for prolongation of ultrasound guided axillary block for day case surgery

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**Background:** It is a prospective randomized trial comparing two different doses of dexmedetomidine (DX) as an additional local anesthetic for axillary block.
**Materials and methods:** Sixty patients, scheduled for upper limb operations, were enrolled in the study. In all patients 75 mg of ropivacaine were administered, and an axillary nerve block by ultrasound guidance was performed. The patients were divided in three groups of 20 patients each. Group A received 100 $\mu$g of DX and group B 75 $\mu$g of DX. Group C was the control group without DX. Recordings: the onset and duration of sensory and motor blocks, the duration of analgesia, sedation scale (from 0 to 4), pain (VRS), BIS, the need for additional analgesia, hemodynamic parameters, and the adverse effects. For statistical analysis anova test was used.
**Results:** Demographic data and surgical characteristics were comparable, and axillary block was successful in all patients. There was no statistically difference among the three groups at onset times for sensory and motor block. The duration of block was significantly longer ($p<0.001$) in group A and B. Heart rate and blood pressure levels were significantly lower ($p<0.001$) in group A and B ($p<0.001$). The duration of analgesia was significantly longer in group A and group B. Statistical difference was observed only between groups A, B and the group C ($p<0.001$). Sedation was higher in groups A and B comparing to group C ($p<0,001$). Group C needed IV midazolam for sedation. There was not statistical significant difference in BIS values between group A and B. Statistical difference there was between the two groups and control group ($p<0.001$). No additional analgesia was given during the operation to all patients. Only eight cases of dry mouth in group A were observed. No other adverse effect has been noted. In all patients of group C (control group) midazolam IV has been administered during the operation. Satisfaction score was the same in all groups.
**Conclusion:** The 75$\mu$g of dexmedetomidine, added as an adjuvant for axillary brachial plexus block, are the optimal dose because they give the same result as the 100 $\mu$g of dexmedetomidine without any adverse effect.

## 03AP05-10

### The effects of different dose levels of peri-neural dexmedetomidine on the pharmacodynamic and side effect profiles of bupivacaine-induced ultrasound-guided femoral nerve block

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**Background and Goal of Study:** Dexmedetomidine extends the duration of brachial plexus block. The clinical use of dexmedetomidine as adjuvant for lower extremities nerve blocks was not adequately investigated. This study was designed to explore the effects of different dose levels of dexmedetomidine on the clinical and side effect profiles of femoral nerve block.
**Materials and methods:** This randomised, controlled double-blind study included 60 adult patients undergoing arthroscopic knee surgery under general anaesthesia. Ultrasound-guided femoral nerve block was performed 30 min before induction of anaesthesia using 25 ml of bupivacaine 0.5%. Bupivacaine was combined with normal saline, 25, 50, or 75μg dexmedetomidine (n= 15, each). All patients received a standard general anaesthetic. The onset and duration of sensory and motor blocks, the time to first request to postoperative analgesic, sedation score, haemodynamic changes, and visual analogue pain scores, were recorded at predetermined intervals. Total postoperative 24 h morphine consumption was recorded. The primary outcome measure was the duration of sensory block. The trial protocol was registered in the Clinical Trials.gov (NCT02089932).
**Results and discussion:** The onset of sensory block was shorter and its duration was extended with the use of 75μg dexmedetomidine: 21.6 (3.0), 23.3 (1.8), 30.8 (3.6), and 43.7 (4.3) h in the control, 25, 50, and 75μg groups, respectively. The onset of motor block was shorter in the 75μg group compared to the control and 25μg groups. The duration of motor block was longer in the 75μg group, 36.1 (6.4) h compared to the other three groups. The time to first request to rescue analgesic was longer in the 75μg group, 10.8 (1.6), 11.0 (7.1) and 21.8 (3.0) and 28.6 (10.0) h, respectively. The total postoperative 24 hour morphine consumption was significantly reduced in the 75μg group compared to the control and 25μg group: 1.8 (2.6), 7.6 (5.1), and 6.5 (3.5) mg, respectively. Postoperative sedation was comparable in all groups. The incidence of hypotension was significantly higher in the 75μg group.
**Conclusion(s):** Peri-neural dexmedetomidine reduces the onset and prolongs the duration of bupivacaine-induced femoral nerve block in a dose dependent manner. The best analgesic profile is achieved with the 75μg dose level, however, this dose should be cautiously used due to the risk of hypotension. Extended motor block might delay early ambulation.

## 03AP05-11

### Comparative study between dexmedetomedine and Fentanyl as adjuvants to bupivacaine in paravertebral analgesia for breast surgery

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**Background and Goal of Study:** There are hundreds of thousands of breast procedures performed annually; many patients require an overnight stay after surgery for breast cancer for management of postoperative pain, Paravertebral block has been shown to provide improved acute postoperative pain management following breast surgery. The aim of this study was to make a comparison between fentanyl and dexmedetmedine as adjuvants to bupivacaine in thoracic paravertebral block in patients undergoing unilateral breast surgery under general anesthesia.
**Materials and methods:** Sixty adult female patients scheduled for elective elective unilateral modified radical mastectomy under general anesthesia were included and were randomly divided into three groups, The study started by preoperative application of an epidural catheter by using the loss of resistance technique at the fourth thoracic paravertebral space and injection of local anaesthetic started preoperatively, dexmedetomedine group (20ml of bupivacaine 0.5% plus 1μg/kg dexmedetomedine), fentanyl group (20 ml of 0.5% bupivacaine plus fentanyl 2 μg / ml) & control group (20 ml of 0.5% bupivacaine) after that general anaesthesia was started for the three groups.
**Results and discussion:** The results revealed significant decrease in the heart rate in the dexmedetomedine group and the fentanyl group than the control; also there was significant decrease in the mean arterial blood pressure in the dexmedetomedine group than the other two groups, there was lower intraoperative fentanyl consumption in patients of the dexmedetomedine group than the fentanyl and the control groups, the dexmedetomedine group had a statistically significant lower postoperative VAS score at rest and during arm movement at all-time intervals with significantly lower demand for post-operative rescue analgesia in comparison with the other groups. Serum cortisol level was significantly lower in the postoperative period in the dexmedetomedine group than the other groups.
Nausea and vomiting were reported in significant number of patients in the fentanyl group than the other groups.
**Conclusion(s):** Paravertebral fentanyl and dexmedetomedine in combination with bupivacaine (0.5%) are effective analgesics, At the doses used, there was much lowering of surgical stress response with dexmedetomedine, the addition of fentanyl was associated with nausea and vomiting while dexmedetomedine was associated with arterial hypotension and bradycardia.

## 03AP05-12

### Efficacy of pethidine in oblique subcostal transverse plain block after laparoscopic cholecystectomy

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**Background and Goal of Study:** Laparoscopic cholecystectomy is associated with postoperative pain of moderate intensity in the early postoperative period. Recent randomized trials have demonstrated the efficacy of transversus abdominis plane (TAP) block in providing postoperative analgesia after abdominal surgery.
This study was designed to evaluate the effect of ultrasound guided oblique subcostal transverse abdominis plane block (OSTAP)using pethidine compared with bupivacaine and systemic analgesia.
**Materials and methods:** Seventy-five patients ASA I/II undergoing laparoscopic cholecystectomy were randomized into three groups.Group I received bilateral OSTAP block using pethidine. Group II received bilateral OSTAP using bupivacaine 0,125%.Group III (Control) placebo group received OSTAP using sterile normal saline.Twenty-four hours postopetrative morphine consumption, the dose of fentanyl (μg) required during surgery and time to first dose of morphine were recorded. The quality of analgesia is assessed by Visual Analogue Scale for 24 h at rest and movement.
**Results and discussion:** The mean dose of intraoperative fentanyl showed significant difference between the three groups, $p<0,001$.The mean 24 h morphine consumption showed statistically significant difference between groups (p value $<0.001$).Pain score of Group I and Group II were significantly lower than Group III at rest and movement respectively in the first 24h.No signs or symptoms of toxicity were noted.
**Conclusion(s):** Pethidine is a good alternative to amino-amide anesthetics and can be used as a local anaesthetic in performing oblique subcostal transverse plane block.
**References:**
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2. Pernille L et al.The Beneficial Effect of Transversus Abdomens Plane Block After Laparoscopic Cholecystectomy in Day-Case Surgery: A Randomized Clinical Trial.Anesthesia-Analgesia 2012 vol115 nr3
3. Yoon S.et al.The analgesic effect of the ultrasound-guided transverse abdominis plane block after laparoscopic cholecystectomyKorean J Anesthesiol 2010 Apr; 58(4): 362-368

## 03AP06-1

### Lateral femoral cutaneous nerve blockade for moderate to severe pain after hip arthroplasty: a randomized blinded trial

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**Background and Goal of Study:** Peripheral regional anesthesia is commonly used for pain management after lower extremity surgery but are limited by the accompanying motor blockade. The lateral femoral cutaneous nerve (LFCN) is a pure sensory branch from the lumbar plexus. We hypothesized that a LFCN-block would reduce movement related pain after total hip arthroplasty in patients with moderate to severe pain.
**Materials and methods:** Sixty patients with visual analogue scale (VAS) score >40 mm during 30 degrees active flexion of the hip on either first or second postoperative day after THA were included in this prospective, randomized, blinded and placebo controlled trial. Group A received a LFCN-block with 8 ml of 0.75 % ropivacaine followed after 45 minutes by an additional LFCN-block with 8 ml of saline. Group B received LFCN-block with 8 ml of saline followed after 45 minutes by an additional LFCN-block with 8 ml of 0.75 % ropivacaine.
**Results and discussion:** We found a difference of 17 mm (95% CI 4 mm to 31 mm, p <0.017) in VAS-pain score during 30 degrees flexion of the hip 45 minutes after the first block (primary outcome) in favor of group A. No significant differences between groups regarding pain at rest was found at any time point. The over-all non-responder rate (defined as a reduction of less than 15 mm during 30 degrees active flexion of the hip 45 min after active treatment) was 42 %.
**Conclusion(s):** Lateral femoral cutaneous nerve block reduced movement related pain in patients with moderate to severe pain scores after THA by the posterior approach. The substantial non-responder rate limits recommendations of this block as part of a standard analgesic treatment recommendation.
**Trial registration:** clinicaltrials.gov, NCT02344264

## 03AP06-2

### Long-term analgesic efficacy of an ultrasound guided single-shot adductor canal block in patients undergoing total knee arthroplasty

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**Background and objectives:** Both single-shot and continuous adductor canal blocks (ACB) have shown promise in reducing postoperative pain in total knee arthroplasty (TKA) patients. In this prospective, randomized and placebo-controlled study, we compared analgesic efficacy, when given as a single-shot *vs.* continuous technique with intermittent boluses during the postoperative period.
**Methods:** 75 patients presenting for primary unilateral TKA received preoperatively an ultrasound-guided single-shot ACB and indwelled postoperatively an adductor canal catheter. Those patients were randomly received: a preoperative single-shot of ropivacaine 0.5%, 20ml following intermittent saline boluses at 12h and 24h postoperatively (S-ACB group), or ropivacaine 0.5%, 20ml preoperatively, 12h and 24h postoperatively (C-ACB group), or saline preoperatively and postoperatively (control group). The primary outcome was pain with movement on postoperative Day1 and Day2. Other endpoints included static pain scores, quadriceps muscle strength, rescue opioid consumption, cost incurred and patient satisfaction.
**Results:** Both ACB techniques were equally effective in diminishing dynamic pain and reducing the side effects normally associated with Pethidine Hydrochloride. Dynamic pain scores of the two ACB groups were lower than those of the control group (S-ACB, C-ACB vs. Control group, 4.0, 3.0 vs. 5.0, p <0.025). Two ACB groups were less likely to use opioids on the first two days after surgery than control (S-ACB vs. C-ACB and control groups, 25.8%, 17%, and 60%, P<0.05). However, patients receiving a continuous block experienced less quadriceps muscle strength (S-ACB vs. C-ACB group, 4[4,5] vs. 4[3,4], 4[4,5] vs. 4[4,4], respectively, P<0.05). Time consumption for a single-shot ACB was 4.0 (1.4) min, which is sharply shorter than those for indwelling an adductor canal catheter (20.0 (5.0) min, P = 0). In addition, there was an extra 80 dollars spent for each adductor canal catheter. Patients receiving a single block experienced more satisfied with their pain-relief treatment (S-ACB vs. C-ACB and control groups, 92% vs. 74% and 60%, P <0.05).
**Conclusions:** Considering the similar analgesic effect, better quadriceps muscle strength, easier operation and higher patient satisfaction the single-shot ACB might be more suitable for TKA patients.

## 03AP06-4

### Pain management after total knee arthroplasty: femoral catheter vs femoral catheter plus sciatic nerve block

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**Background and Goal of Study:** Arthrosis is a very common degenerative joint disease which is associated with a decrease in life quality and an increase in health costs. Knee arthrosis is one of the most frequent clinical presentations and at late stages it usually requires surgical treatment, being the total knee arthroplasty (TKA) the gold standard.
TKA is associated with substantial early postoperative pain; thus, pain management is critical. The purpose of this observational study is to determine whether femoral nerve block (FNB) plus sciatic nerve block provides better analgesia after TKA than FNB alone.
**Materials and methods:** The study included 46 patients, ages between 50 and 85 (median 75), ASA I-III, weight between 50 and 120 kg. TKA was performed under spinal anesthesia.
Patients undergoing TKA were randomly divided into two groups. Patients from group A received FNB, while patients from group B received both FNB and sciatic nerve block.
During the early postoperative period a femoral catheter with continuous local anesthetic infusion was placed in both groups. Group B patients also received a single shot sciatic nerve block.
To evaluate the efficacy of these techniques we compared the VAS score in both groups 2, 4, 12 and 24 hours after surgery and the need of intravenous boluses of opioids.
**Results and discussion:** The Mann-Whitney test was used to compare the mean VAS scores on the first 24h after the procedure. Score was 3.6 for group A and 1.9 for group B 24h after surgery, with significant differences observed between both groups (p 0.0063; IC 95%).
Using the Fisher test we also compared the need of iv analgesia, results showed that patients from group B needed less iv drugs (p 0.0004; IC95%).
46% of the patients who initially met the inclusion criteria were later excluded from the study because all of them needed iv PCA analgesia, mostly due to catheter migration.

| | GROUP A | | | | GROUP B | | |
|---|---|---|---|---|---|---|---|
| VAS | AVERAGE | SD | MEDIAN | P VALUE | AVERAGE | SD | MEDIAN |
| 2 h | 1.4 | 0.8 | 2 | 0.001 | 0.3 | 0.5 | 0 |
| 6 h | 3.3 | 1.2 | 3 | 0.0004 | 1.2 | 1.3 | 1 |
| 12 h | 4.2 | 1.2 | 4 | 0.001 | 2.3 | 1.3 | 2 |
| 24 h | 3.6 | 1 | 3 | 0.006 | 1.9 | 1.7 | 2 |

*[Table 3]*

**Conclusion(s):** Patients who received both, FNB and sciatic nerve block, had better pain control after TKA than those who only received FNB. Catheter migration appears to be one of the most important limitations of the FNB, therefore it must be fixed carefully.

## 03AP06-5

### Continuous sciatic nerve block with a new catheter - primary placement and secondary displacement

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**Background and Goal of Study:** A new catheter for continuous peripheral nerve block has been developed and preliminary cadaver studies suggest high success rates for initial placement with possible repositioning in case of displacement.
The aim was to investigate the success rate for primary placement of the new catheter for sciatic nerve blocks.
**Materials and methods:** We conducted a single center, double blinded, placebo-controlled, randomized trial in 16 healthy volunteers following ethical approval (H-15000927). A catheter was inserted in each leg in the popliteal region with ultrasound (US) using a short axis approach. The volunteers were randomized to receive 15mL lidocaine (20mg/mL) in one side and 15mL 0.9% saline in the contralateral side. We assessed cold sensation on the lateral part of the lower leg and measured voluntary muscle force for dorsi- and plantarflexion and surface EMG (sEMG).
Successful placement of the catheter was defined as >20% decrease in gross isometric dorsiflexion force and loss of cold sensation on the lateral part of the lower leg.
After return of normal sensory and motor function the volunteers performed a series of physical exercises simulating mobilization and physiotherapy including walking up and down two flights of stairs. We performed a second injection of local anaesthetic (LA) and placebo in the catheters. Catheter position was assessed with US. A second investigator blinded to earlier assessments tested cold sensation and muscle force.
**Results and discussion:** 94% (95% CI [72-99%]) of primary placements were successful although all patients had loss of cold sensation.

| Sensory | | Motor | | | |
|---|---|---|---|---|---|
| Loss of cold sensation | Loss of cold sensation | 20 % force reduction dorsal flexion | 20 % force reduction dorsal flexion | 20 % force reduction plantar flexion | 20 % force reduction plantar flexion |
| T1 | T2 | T1 | T2 | T1 | T2 |
| 16/16 (100%) | 14/16 (88%) | 15/16 (94% | 11/15 (73%) | 13/16 (81%) | 10/13 (77%) |

T1: first injection of LA; T2: second injection of LA; (%) at T1: fraction of all blocks that had loss of function. (%) at T2: fraction of blocks that still had loss of function at T2.

*[Sensory and motor function after LA injection]*

The peroneal nerve was more often affected than the tibial nerve with regard to motor force and sEMG.
After physical exercise, all catheters were assessed by US with repeated injection of LA and assessment of motor and sensory function. 11 of 15 catheters with initial successful placement had both sensory and motor block and were never displaced more than 0.5 cm.
**Conclusion:** The new catheter can be placed with high success rate. Physical exercise may cause displacement of the catheters but clinical studies are needed to evaluate the rate and clinical relevance of the displacement in patients.

## 03AP06-7

### Minimum effective local anesthetic volume for surgical anesthesia by subparaneural ultrasound-guided popliteal sciatic nerve block

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**Background and Goal of Study:** The purpose was to determine the minimal effective volume and effective dose for surgical anesthesia by ultrasound-guided popliteal sciatic nerve block using a subparaneural injection technique.
**Materials and methods:** Thirty patients underwent an ultrasound-guided popliteal sciatic nerve block with ropivacaine 0.75% at a 20-mL starting volume. Using a step-up/step-down method, injection volumes were determined for consecutive patients from the preceding block's outcome. When an effective block was achieved within 40 min after injection, the next patient's volume was decreased by 2 mL. If the block failed, the next patient's volume was increased by 2 mL.
**Results and discussion:** The volume of ropivacaine 0.75% resulting in a successful subparaneural block of the sciatic nerve in 50% of patients according to the up-and-down sequence was 7.1 mL (95% confidence interval, 5.7-8.6 mL). Effective doses in 90%, 95%, and 99% of patients were calculated using a prohibit regression analysis; values for an adequate sciatic nerve block by subparaneural injection were 8.9 mL, 9.9 mL, and 11.8 mL, respectively.
**Conclusion(s):** This is the first study where the local anesthetic volume for effective surgical anesthesia was evaluated for a popliteal sciatic nerve block. Effective doses in 90%, 95%, and 99% of patients were estimated with a prohibit regression as 8.9 mL, 9.9 mL, and 11.8 mL, respectively. The effective dose in 95% of patients of 9.9 mL in our study is a 67% reduction in volume versus the nerve stimulation technique and a 31% reduction versus an ultrasound-guided popliteal sciatic nerve block using perineural injection.

## 03AP06-8

### The minimum effective volume of local anesthetic in ultrasound-guided sciatic nerve block for diabetes-related lower limb amputation

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**Background and Goal of Study:** Diabetic patients with peripheral neuropathy may have an altered response to local anesthetics (1). The aim of this study was to o determine the minimum effective local anesthetic volume for safe ultrasound (US) guided sciatic nerve block (SNB) in diabetic patients who have peripheral neuropathy for lower limb amputation.
**Materials and methods:** After local ethics committee approval (No. 2012/44) and patient consent, we performed a prospective, observer-blinded, up-down sequential, allocation study. Diabetic patients undergoing US-guided SNB for lower extremity amputation were enrolled in the study. All patients recieved the same volume of local anesthetic (LA) mixture of 0.5% levobupivacaine 5 ml and 2% prilocaine 5 mL for US-guided femoral nerve block. The initial volume was 20 mL of LA ( 50:50 mixture of 0.5% levobupivacaine and 2 % prilocaine) for US-guided SNB. Successful block was defined as complete sensory and motor block 30 minutes after application. In the event of successful block the next patient was assigned to receive 1 ml lower volume. In the event of a failed block the next patient received a 1 ml higher volume. The sample size calculation was based on Dixon up-and-down method which requires at least six pairs of failure success. The probit test was used in the analysis of up-down sequences.
**Results and discussion:** A total of 26 diabetic patients were were included in the study. The minimum effective volume of LA (50:50 mixture of 0.5% levobupivacaine and 2 % prilocaine) in 50% and 95% of patients were **13 ml** (%95 confidence interval, 12.1-13.7 ml) and **14.3 ml** (% 95, confidence interval, 13.6-20.1 ml) respectively.
**Conclusion(s):** In this study, we report a reduced minimum effective volume of local anesthetic for US-guided SNB in diabetes-related lower limb amputation.
**Reference:**
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## 03AP06-9

### Major lower extremity amputations (MLEA) with peripheral nerve blocks (PNB) as the anesthetic technique in high-risk patients

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**Background:** MLEA (above and below knee amputations) are associated with considerable mortality and morbidity. Studies have shown mortality benefits of using regional anesthesia techniques. Effects of peripheral nerve blocks as the sole anesthetic technique in high-risk patients undergoing MLEA have not been fully evaluated.
**Objectives:**
a. To study the use of PNB as the sole anesthetic technique in ASA 4 and 5 patients having MLEA.
b. To analyze mortality rates and its association with risk factors.
**Methods:** Data were analyzed retrospectively for 70 high-risk patients [99% (69) ASA 4, 67% (47) males, mean age 68 years ± SD 13, range 36-97] from a total of 153 patients undergoing MLEA between years 2010-2014.
**Results:** Out of 70 patients, 17% (12) received Popliteal, Femoral/Fascia Iliaca, 50% (35) received Subgluteal Sciatic, Femoral and 33% (23) received Subgluteal Sciatic, Femoral, Obturator and Lateral cutaneous nerve of thigh blocks.
There was no statistically significant difference between the three groups on comparing the intraoperative sedation level (p=0.63), sedation scores (p=0.65) or pain scores (p=0.86) on arrival to post anesthesia care unit.
Mortality rates showed no significant differences (p>0.05) between the high-risk and non high-risk groups, as illustrated in Table 1.

| Mortality | 30 days | 3 months | 6 months | 1 year |
|---|---|---|---|---|
| High-risk: ASA 4 & 5 (n=70) | 11.4% (8) | 15.7% (11) | 21.4% (15) | 31.4% (22) |
| Non High-risk: ASA 1-3 (n=83) | 8.3% (7) | 13.1% (11) | 14.3% (12) | 20.2% (17) |

*[Table 1: Mortality in patients undergoing MLEA]*

Significant predictors of mortality included end stage renal failure (ESRF) (30 days: 31% vs 7%, p=0.03; 3 months: 39% vs 11%, p=0.03; 6 months: 46% vs 16%, p=0.03) and raised troponin T (T hs > 50pg/ml) within 6 months preoperatively (3 months 22% vs 0%, p=0.03).
The presence of hypertension, hyperlipidemia, ischemic heart disease, diabetes mellitus, male gender, ejection fraction (EF)<50%, and age> 79 years were found to be non-significant predictors of mortality.
18 patients with EF<25% had a 0% mortality rate at 30 days. Patients continued on antiplatelets at time of surgery showed no mortality benefits.
**Conclusion(s):** Our study suggests that PNB can be used as the sole anesthetic technique in high-risk patients having MLEA. ESRF and raised Troponin T were significant predictors of mortality. Mortality rates were comparable to those reported in literature.
**Acknowledgements:** Authors would like to thank Ms Carmen Kam, Research Officer, for her assistance with statistical analysis.

## 03AP06-11

### Selective tibial nerve block for posterior knee analgesia after total knee arthroplasty: are two concentrations of local anesthetics equivalent?

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**Background and Goal of Study:** Although continuous femoral nerve block (CFNB) is often used for analgesia after total knee arthroplasty (TKA), most patients complain of posterior knee pain postoperatively. Sciatic nerve block (SNB) has been used to prevent posterior knee pain since 2009. Orthopedic surgeons do not prefer SNB because it may obscure the diagnosis of peroneal nerve paralysis postoperatively. Therefore, since 2013, we have performed selective tibial nerve block (TNB) to prevent posterior knee pain. The goal of our study was to determine the minimum concentration of local anesthetics for tibial nerve block that would provide adequate analgesia for the posterior knee area.
**Materials and methods:** This was a retrospective study of 89 patients who underwent TKA from October 2013 to July 2015. Of these, 37 patients received CFNB and TNB with 10 ml of 0.15% ropivacaine (Group A), and 52 patients received CFNB and TNB with 10 ml of 0.375% ropivacaine (Group B) under ultrasound guidance before surgery. Postoperative analgesics (e.g. acetaminophen or bupurenorphine suppository) were prescribed as needed. Our outcome measure was postoperative pain assessed using the visual analog scale (VAS; range: 0-100 mm): posterior knee and overall knee pain at rest on POD 0, 1 and 4, dynamic pain (knee flexion) on POD 1 and 4, and pain on walking on POD 4. Mann-Whitney's U test was used to evaluate the difference in postoperative pain between the two groups. The level of significance was set at $P < 0.05$.
**Results and discussion:** Median VAS scores for posterior knee pain were 0, 37, and 0 for Group A and 0, 31.5, and 13.5 for Group B on POD 0, 1 and 4, respectively (p=0.17, 0.21 and 0.53, respectively). Median VAS scores for overall knee pain were 0, 45 and 9 for Group A and 0, 49.5 and 25 for Group B on POD 0,1 and 4, respectively (p=0.86, 0.61, 0.99 respectively). Median VAS scores for dynamic knee pain were 87 and 65 for Group A, and 73 and 71 for Group B on POD 1 and 4, respectively (p=0.015 and 0.31, respectively). Median VAS scores for pain on walking were 23 for Group A and 34 for Group B (p=0.4 ). Only VAS scores for dynamic knee pain on POD 1 were statistically significantly different between the two groups.
**Conclusion(s):** Selective tibial nerve block of the posterior knee area provided adequate analgesia. Both concentrations of ropivacaine provided an equivalent effect for posterior knee pain after TKA.

## 03AP06-12

### Preoperative intravenous Dexamethasone in peripheral sciatic nerve block: does it improve block quality and duration?

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**Background and Goal of Study:** The ideal adiuvant to peripheral nerve block should increase block duration and/or decrease local anesthetic dose. We hypotized that patients receiving preoperative intravenous Dexamethasone would have a better quality of recovery and improved analgesia duration. We didn't consider perineural dexamethasone administration because of its potential neurotoxicity and because we took advantage of the potential analgesic and/or antiemetic effects of intravenous administration.
**Materials and methods:** In our study we enrolled 36 patients aged between 38 and 66, 6 male and 30 female, underwent surgery for hallux valgus correction. They received spinal anaesthesia and single shot sciatic nerve block, and were randomized into 2 groups:
group 1: dexamethasone 8 mg iv as adiuvant;
group 2: normal saline.
The primary outcome was the globalscore in quality of recovery (QoR-40) and analgesia evaluated with NRS in preoperative period, 120' after procedure, 24h, 48h, 5 days. We also evaluated consumption of rescue doses of opiods and non-opiods drugs.
**Results and discussion:** Aanesthesiologic procedures were succesfully performed in all cases and there have been no adverse events or side effects of drugs administered. There was no significant difference between the 2 groups in terms of analgesia and first toe movement. Self-reported pain rating scores at 48h and 5 days were not different among dexamethasone or normal saline. Postoperative analgesic drugs consumption was not different among study groups.
**Conclusion(s):** Preoperative intravenous Dexamethasone compared with normal saline did not improve or decreased analgesic drugs consuption and analgesic duration in patients undergoing elective hallux valgus surgery receiving spinal anesthesia and single shot sciatic nerve block.
**References:**
"the effects of perineural versus intravenous dexamethasone on sciatic nerve blockade outcomes: a randomized, double-blind, placebo-controlled study" Rahangdale R et al. "I.V.
Perineural dexamethasone are equivalent in increasing the analgesic duration of a single-shot interscalene block with ropivacaine for shoulder surgery: a prospective randomized placebo-controlled study" Desmet et al. "Intravenous and perineural dexamethasone in peripheral nerve block: are they truly equivalent?" Lee S et al.

## 03AP07-1

### Continuous wound infiltration versus epidural analgesia after hepato-pancreato-biliary surgery (POP-UP): a multicentre, randomised controlled, open-label, non-inferiority trial

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**Background and Goal of Study:** Epidural analgesia is the international standard for pain treatment after laparotomy including for hepato-pancreato-biliary surgery. Although some studies have suggested that continuous wound infiltration with local anaesthetic could be equally effective, robust evidence is lacking, especially on patient reported outcomes. We aimed to determine the effectiveness of continuous wound infiltration in the field of open hepato-pancreato-biliary surgery.
**Materials and methods:** In this multicentre, randomised controlled, open-label, non-inferiority trial (POP-UP), we enrolled adult patients undergoing open hepato-pancreato-biliary surgery in two Dutch hospitals. Patients were centrally randomised (1:1) to either pain treatment by continuous (subfascial) wound infiltration (CWI) with bupivacaine plus patient controlled analgesia (PCA) with morphine or (patient controlled) epidural analgesia with bupivacaine and sufentanil. All patients were treated within an enhanced recovery setting. Randomization was stratified by centre and type of incision (subcostal/midline). The primary outcome was the mean Overall Benefit of Analgesic Score (OBAS) from day 1-5, a validated composite endpoint of pain scores, opioid side effects and patient satisfaction. Analysis was by per-protocol. To establish non-inferiority, the upper bound of a one-sided 90% confidence interval for the mean OBAS from day 1-5 had to be less than +3.0. The trial is registered with the Netherlands Trial Registry, number NTR4948.
**Results and discussion:** Between Jan 20, 2015 and Sept 16, 2015, we randomly assigned 102 eligible patients. In the per-protocol analysis, the median OBAS was 3.0 [IQR 2.0-4.8] vs 4.0 [IQR 2.4-5.8] in favour of the CWI group (n=55 vs n=47), with the upper bound of the one-sided 90% CI +0.13 (95% CI: -1.54-+0.30), meeting the criteria for non-inferiority (p<0.0001). One serious adverse event, temporary local anaesthetic toxicity, occurred in the CWI group (2%). There was less vasopressor use in the CWI group ((median; IQR) 0.3 [0-0.8] vs 0.7 [0.3-1.5] mg norepinephrine, p=0.008) and shorter duration of indwelling urinary catheters ((median; IQR) 4 [3-5] vs 5 [4-6] days, p=0.02).
**Conclusion:** Continuous wound infiltration is non-inferior to epidural analgesia after open hepato-pancreato-biliary surgery concerning quality of analgesia, side effects, and patient reported outcomes.

## 03AP07-2

### Choice of method neuraxial blockade in elderly patients underwent to total hip arthroplasty

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**Background and Goal of Study:** The majority of patients with fractures of the proximal femur are elderly people, mostly women. This category features a large number of patients with underlying chronic diseases. A comparative assessment of different types of neuraxial (spinal, epidural or spinal unilateral) at total hip arthroplasty (THA) in elderly patients with subsequent optimization of anesthesia in the surgical treatment of femoral neck fractures in geriatric patients.
**Materials and methods:** Survey of 108 ASA II-III patients aged 66 to 85 years who underwent total hip arthroplasty.All three groups were comparable in age, physical status, comorbidities. From anesthesia type perspective, allpatients were divided into three groups: group I (n = 32), surgery was performed under epidural anesthesia (EPI) solution of ropivacaine 0,75%,group II (n = 37) - spinal anesthesia (S) with a 0,5% bupivacaine, group III (n = 39) unilateral spinal anesthesia (US) with a 0,5% hyperbaric bupivacaine. As the criterion for estimating the frequency of hemodynamic disturbances, we looked at the frequency of ephedrine usage.
**Results and discussion:** In a comparative assessment of changes in MAP it was found that the maximum reduction in SBP in the group I (EPI) occurs on the 25+6.3 minute to level 79 mm Hg, which amounted to 25% of baseline blood pressure MAP (p<0,05), in the second group II(S) the maximum reduction in MAP was noted on the 15+4.1 minute to 71.7 mm Hg, which amounted to 32% of baseline (p<0,05). In the III-rd group (US) have been reported by the smallest change in MAP from baseline: the maximum reduction of 90 mm Hg recorded on average on the 30th minute, which amounted to 17% of baseline (p <0,05). There was less severe hypotension in group III- probably due to the limited sympathetic block.The incidence of hypotension in the comparative assessment of the three groups was: I(EPI), II (S) and III (US) 25%, 29.7% and 7.7%, respectively. Volume infusion in groups was: 2724 ± 845,3 2576,6 ± 562,8ml mL and 2036 ± 57,5ml respectively. The total average dose of ephedrine to maintain MAP at the level no lower than 90 mm Hg in I(EPI), II (S) and III (US) was 20+2.1 mg, 22+ 2,5 mg and 10+ 1.5 mg, respectively.
**Conclusion(s):** Application of unilateral spinal anesthesia as anesthetic option for total hip arthroplasty in elderly patients promotes greater hemodynamic stability, lower infusion volume and less sympathomimetic support.

## 03AP07-3

### Enhanced recovery after surgery: is a combination of intrathecal opioid with rectus sheath catheter a better alternative than an epidural in major gynaecological - oncology surgeries?

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**Background:** Enhanced Recovery After Surgery (ERAS) is increasingly used in many other surgical specialties for encouraging a more rapid postoperative recovery but has been slow to implement in gynaecological-oncology. Gynaecological-Onocology Surgery has made significant advances in diagnostic and operative techniques, yet advances in length of stay (LOS) and postoperative activity are yet to be seen. The objective of this study was to evaluate the influence of analgesia regimes in order to tailor an ERAS protocol specifically for this cohort of patients. Traditionally this group of patients received the current accepted standard of a general anaesthesia (GA) with thoracic epidural (TEA) - Group 1. We proposed a modified ERAS protocol with analgesic premedication, intraoperative neuroaxial block (spinal with diamorphine) alongside the GA and postoperative rectus sheath catheters (RSC), with oral analgesia - Group 2.
**Methods:** This observational study involved data collection, of 86 patients who had undergone surgery over the last 12 months. The goal was to compare and contrast the proposed ERAS protocol with current practice in patients with incisions below T9, with particular focus on pain scores and postoperative activity times for, both of which directly impact LOS. Data was analysed using excel and all statistics were performed using Minitab 12 with a combination of two sample T test and ANOVA GLM.
**Results:** 32 retrospective 31 prospective patient records were included in the final results. Average age and surgical time for group 1 was 58 Years and 252 Minutes and for group 2 was 61 years and 169 Minutes.
Results showed that there was statistically better pain scores for group 2, at 36 48 and 72 hours indicating an approach of a spinal + RSC is superior to GA+TEA .
In addition there was a significant improvement in time for all-postoperative activities in group 2.
There was no significant difference in postoperative patient satisfaction scores, complications or nausea and vomiting between the two groups.
**Conclusions:** The use of the proposed ERAS protocol has been shown to be more effective than the current standard approach in our hospital population. The application of the proposed ERAS protocol significantly benefits patients in the postoperative period, particularly pain scores and activity. The impact of which will hopefully reduce LOS and improve patient experience.
However in order to prove significant benefit, we need further RCTs.

## 03AP07-4

### Ultrasound assisted neuraxial anesthesia; uptake of a novel technique amongst anesthesiologists

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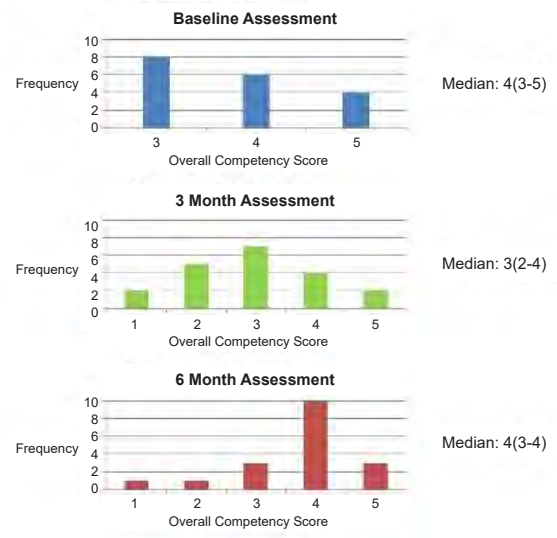
**Background:** Ultrasound (US) is useful to identify the neuraxial block insertion point (NB-US), despite sparse adoption of this practice. Studies on this technique of NB-US report expert practitioners who identify the optimal insertion point, or learning curves - skill retention is rarely assessed. We assessed anesthesia practitioners' ability to retain knowledge of NB-US over a 6 month period.
**Methods:** Following IRB approval, 34 novice NB-US anesthesia practitioners in a single center underwent one of two practical training sessions on NB-US. Nineteen (56%) participants agreed to be followed up by the single assessor. We recorded 6 competency measures (5-point Likert scale) including an overall assessment score [1]. Statistical analysis evaluated the null hypothesis that there is a change in competency over time after the training session, at 3 and 6 months.
**Results:** Of the 19 practitioners, 8 (42%) rarely used US for procedures and 10 (53%) used US often. The median (IQR) baseline competency score at the end of the training session was 4(3-5), that dropped to 3(2-4) at the 3-month assessment, and at the 6-month assessment was 4(3-4). Nine participants did not use NB-US during the assessment period, and 10 used it during the first three months, dropping to 5 during the last 3 months of the assessment period, Figure.




*[Figure. Frequency of overall competency scores for each assessment]*

**Conclusions:** The assessed ability of practitioners in performing NB-US was high at baseline and returned to this level by 6 months, despite a dip in competency at 3 months and despite infrequent use. This suggests that NB-US can be easily learned and the knowledge is retained. It is likely that the assessments acted as reminders of the importance of NB-US and this may have re-enforced knowledge. This skill retention pattern suggests that NB-US can be learned by non-expert anesthesiologists, and the skill can be retained over time.
**Reference:**
Sultan, S.F, et al. Acta Anaesthesiologica Scandinavica, 2012. 56(5): p. 616-623
**Acknowledgments:** The authors would like to thank Professors Jose Carvalho and Stephen Halpern for giving the initial training sessions.

## 03AP07-5

### The use of epidural single-shot on lumbar spinal stenosis surgery

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**Background:** Postoperative back pain is common after Surgical Correction of Lumbar Spinal Stenosis (SCLSS). It is associated with many complications that delay hospital stay [1,2]. Epidural analgesia for lumbar spine surgery has proven to be an effective and safe strategy, providing advantages over systemic analgesia with opioids [3]. The purpose of this study is to evaluate the analgesic impact of the use of Epidural Single-Shot (ESS) in Lumbar Spinal Stenosis Surgery.
**Materials and methods:** A retrospective study was conducted between Jan-Dec 2014 in a single-center. 48 patients were submitted to SCLSS, of them 41 patients were included in the study: 10 had an ESS with 6 mL of 0.25% Levobupivacaine (15mg) and 1 mL of fentanyl (0.05 mg) before the induction of anesthesia; and 31 patients receive only systemic analgesia (SA). In all the included patients was performed: intravenous induction, intraoperative analgesia with fentanyl and Paracetamol, Tramadol and Ketorolac, and maintenance with Sevoflurane.
The following variables were analyzed:
- Amount of opioid consumed during surgery
- Duration of surgery and analgesia
- Assessment of pain upon arrival to the recovery room and during the administration of the 1st SOS
- Number of SOS analgesics in the recovery room and the first 24 hours
- Vital signs (MAP, max. and min. heart rate)
- Complications after surgery.

We used SPSS (PSAW Statistics 18) for statistical analysis, non-parametric tests were performed, and a value of $p < 0.05$ was defined as a statistically significant result.
**Results and discussion:** It was found that the ESS group consumed fewer opioids during surgery ($p<0.001$) (Average consumption of fentanyl in mg: ESS 0.12mg vs SA 0.23mg).
The ratio opioid consumption/time surgery was smaller in the ESS group ($p=0.021$) (ESS 1.7mcg/min vs SA 2.7mcg/min).
We observed a longer duration of analgesia in ESS group ($p=0.108$) (ESS 513min vs SA 287min) and a smaller number of SOS in the recovery room ($p=0.134$) (ESS 0.64 vs SA 1.32).
No statistically significant differences in the remaining variables.
It should be noted that there were no complications in both groups.
**Conclusion:** The use of ESS is effective and safe in SCLSS surgery. It saves opioid administration during surgery and probably improves the quality of analgesia in the immediate postoperative period.
**References:**
1. The Spine Journal. 2012; 12: 646-655
2. SPINE. 2006; 31(19): 2221-2226
3. British Journal of Anaesthesia. 2005; 94(3): 378-380

## 03AP07-6

### Effects of epidurally administered ropivacaine concentration on the hemodynamic parameters

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**Background and Goal of Study:** Epidural analgesia, combined with general anesthesia, is an established anesthetic choice for major abdominal surgery. However, there are controversies about adequate dosage and concentration of local anesthetics epidurally administered. The aim of the study was to compare the hemodynamic effects of different concentrations of epidural ropivacaine under combined epidural/general anesthesia.
**Materials and methods:** One hundred and twenty patients scheduled for major abdominal surgery were randomly divided into three groups according to the concentration of epidurally administered ropivacaine after the induction of anesthesia: 0.75% ropivacaine group, 0.375% ropivacaine, or 0.2% ropivacane group. Anesthesia was maintained with sevoflurane, the anesthetic concentration was adjusted to achieve the target BIS score of 40-60. The mea-

surements included mean blood pressure (MBP), heart rate (HR), stroke volume variability (SVV), and central venous pressure (CVP) during first 1 hour after epidural injection of loading dose. Additionally, the correlation between those hemodynamic parameters and the usage of vasopressor was analyzed.
**Results and discussion:** MBP was significantly lower in the 0.75% of ropivacaine group compared with other groups. However, HR and CVP did not differ among the groups. SVV showed significantly higher in 0.75% of ropivacaine group. Moreover, for prediction of hemodynamic change, stroke volume variability showed better performance than CVP. Vasopressors were used more often in 0.75% ropivacaine group.
High concentrations of epidural ropivacaine caused bigger change of hemodynamic parameters. As a prediction tool for change of hemodynamics, SVV would be more helpful than CVP.
**Conclusion(s):** Our observations support the hypothesis that higher concentration of ropivacaine administered epidurally induces more hemodynamic changes and SVV could be a predictive tool for detection of those changes.
**References:**
1. Panousis P, Heller AR, Koch T, et al. Epidural ropivacaine concentrations for intraoperative analgesia during major upper abdominal surgery: A prospective, randomized, double-blinded, placebo-controlled study. Anesth Analg 2009; 108: 1971-6.
2. Ginosar Y, Weiniger CF, Kurz V, Babchenko A, et al. Sympathectomy-mediated vasodilatation: A randomized concentration ranging study of epidural bupivacaine. Can J Anaesth 2009; 56: 213-21.
**Acknowledgements:** This study was registered at Clinical Trials. gov (NCT01559285)

## 03AP07-8

### The hemodynamic effects of angiotensin receptor blockers in patients under combined spinal epidural anesthesia

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**Background and Goal of Study:** This study aimed to determine the hemodynamic effects and postoperative complications associated with angiotensin receptor blockers (ARBs) and supplemental drugs for hypertension treatment in patients undergoing total knee arthroplasty surgery under combined spinal epidural anesthesia (CSEA).
**Materials and methods:** This prospective study included 115 ASA physical status II-III patients aged 60-80 years that were using ARBs for ≥3 months for chronic hypertension and were scheduled for total knee arthroplasty. The patients were divided into 5 groups according to their antihypertensive medications. Group ARB (n = 15) used ARBs only, group ARB+D (n = 55) used ARBs and diuretics, group ARB+D+ßB (n = 25) used ARBs, diuretics, and beta-blockers, group ARB+D+CCB (n = 11) used ARBs, diuretics, and calcium channel blockers, and group ARB+D+ßB+CCB (n = 9) used ARBs, diuretics, beta-blockers, and calcium channel blockers. When patients arrived in the surgical suite 1 peripheral vascular access was opened and all patients received 500 mL of NaCl 0.9%. Midazolam 2 mg IV was administered for sedation. Standard monitorization was performed and CSEA was administered. Before surgery a tourniquet was inflated to 100 mmHg higher than systolic blood pressure. Heart rate, systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean blood pressure (MBP) were recorded preoperatively in clinical ward, intraoperatively in the surgical suite every 5 min, and postoperatively
**Results and discussion:** Heart rate, SBP, DBP, and MBP did not differ significantly between the groups at each measurement time point (preoperative, intraoperative, and postoperative) ($P > 0.05$). In all, 4 patients had intraoperative hypotension, all of which were successfully treated with 1 dose of ephedrine.
**Conclusion(s):** Optimal peroperative management of renin-angiotensin-aldesteron system (RAAS) blockers requires multifactorial assessment. Based on the present findings, when fluids and appropriative anesthetic drugs are administered appropriately CSEA is not a problem in patients using RAAS blockers.

## 03AP07-9

### Comparing three different doses of caudal morphine for analgesia after Salter innominate osteotomy

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**Background and Goal of Study:** Single dose caudal block application is preferred among children since it is a safe and easy method. Caudal morphine has an important advantage with its long half-life. However, caudal morphine application has some side effects such as nausea-vomiting, urinary retention, pruritus, sedation and respiratory stiffness and many of those are dose-dependent.
The aim of this study was to determine the minimum morphine doses that will provide adequate analgesia and by this way to diminish the life threatening side effects such as respiratory depression as well as comfort-threatening side effects such as nausea-vomiting.
**Materials and methods:** Among 60 pediatric patients aged between 1-9 years, who were planned to have Salter operation forcongenital hip dislocation, with ASA classification of I-II. Premedication was not applied in any of the cases.
Patients were sub-grouped randomly and for 15, 20 or 25 $\mu$g.kg-1 caudal morphine administration: G15, G20 and G25. Caudal injections were performed under general anesthesia just before the operations. Having total volumes of 0,75 ml.kg-1, caudal injections were performed with 15, 20 or 25 $\mu$g.kg-1 morphine together with 0.25% bupivacaine according to the groups. The first time of analgesic requirement was recorded.
**Results and discussion:** The number of cases required analgesia in first 24 hours was determined as 4 (20%), 3 (15%) and 2 (10%) in Group 15, Group 20 and Group 25, respectively.
There was not statistically significant difference between groups ($P>0.05$). In none of the patients, the pain level was as high as causing restlessness (score 2). With single dose Paracetamol, pain cured in all of these patients. Postoperative nausea and vomiting in first 24 hours was reported in 1 (5%), 2 (10%) and 8 (40%) cases in 15, 20 and 25 $\mu$g.kg-1 groups, respectively. Although the difference between Groups 15 and 20 was not statistically significant ($p=0.548$), the number of patients with nausea and vomiting in Group 25 was statistically significantly higher than that of Group 15 and Group 20 ($p=0.009$ and $p=0.025$, respectively).
In first 24 hours in postoperative period, respiratory depression was not observed in any of the cases.
**Conclusion(s):** We determined that decreasing the caudal morphine dose to 15 $\mu$g.kg$^{-1}$ in Salter osteotomy does not decrease analgesia in 24 hours but minimizes nausea-vomiting incidence.

## 03AP07-10

### The skin temperature under epidural anaesthesia

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**Background and Goal of Study:** It is difficult to evaluate the deepness and wideness of sympathetic block, provided by regional anaesthesia, compared to motor and sensory components. Changes in skin temperature may be useful in this content.
**Materials and methods:** The skin temperature in different regions of lower extremity was measured with infrared thermometer before and after epidural block in 16 patients. The epidural anesthesia was performed in L3-L4 with 18 ml 0.5% bupivacaine. The skin regions were taken in accordance with innervation: nervus ischiadicus - heel and big toe, nervus femoralis - anterior surface of knee, nervus obturatorius - medial surface of thigh, nervus cutaneus femoris lateralis - lateral surface of thigh. All results are given as Mean ± standard deviation.
**Results and discussion:** The skin temperature on the plantar surface of heel increased from 24.2±3.1˚C to 28.4±4.6˚C ($P=0.0071$). On the big toe temperature increased from 21.2±2.3˚C to 27.5±5.8˚C ($P=0.0076$). On the anterior surface of knee the temperature was not changed (32.8±1.21˚C before and 32.8±1.42˚C after epidural anaesthesia; $P=0.39$). On the medial surface of thigh the temperature increased insignificantly (31.7±0.8˚C before and 32.2±1.43˚C after epidural anaesthesia; $P=0.29$).

On the lateral surface of thigh the temperature slightly decreased (30.3±2.3˚C before and 30.0±2.7˚C after epidural anaesthesia; P=0.28).
**Conclusion(s):** Under epidural anaesthesia the skin temperature of legs significantly increases in distal regions.

## 03AP07-11

### Audit: skin antisepsis for central neuraxial blockade practice

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**Background and Goal of Study:** The Association of Anaesthetists of Great Britain and Ireland (AAGBI) published guidelines for skin antisepsis for central neuraxial blockade (CNB) [1] in September 2014 that specifically considered which agent to use for skin antisepsis before CNB and the method of application. We conducted a clinical audit to ensure compliance with this guideline.
**Materials and methods:** A proforma was designed according to the recommendations made by AAGBI. It includes the optimum aseptic technique, solution used, method of application, number of application, measures to prevent contamination and awareness of the guideline. It was distributed to all anaesthetists in the anaesthetic department.
**Results and discussion:** We had a response rate of 79% out of 67 from the department.Trainees and NCCG achieved 100% compliance for aseptic technique but not consultants.
The majority (92%) uses 0.5% Chlorhexidine in alcohol which is the recommended solution. Spray bottle is the most common technique (96%) for method of application. To prevent contamination, 98% of us ensure the solution is fully dry before touching the skin.
However, other ways to prevent contamination are less compliant and only 28% routinely check gloves for contamination. Only 72% of the respondents were aware of this latest guideline.
Chlorhexidine in alcohol is a very effective antiseptic. However there is concern of neurotoxicity causing adhesive arachnoiditis with Chlorhexidine. As 2% Chlorhexidine is not more effective than 0.5% Chlorhexidine, 0.5% Chlorhexidine in alcohol is the recommended solution. Steps to prevent contamination as recommended should also be adhered to.
**Conclusion(s):** This guideline provides clear guidance of solution used and method of application to decrease risk of infection and also risk of neurotoxicity. Hence, all anaesthetists or any practitioners performing CNB should adhere to this guideline. We plan to re-audit in 1 year time.
**Reference:**
1. J Campbell, F Plaat, M Checketts, D Bogod, S Tighe, A Moriarty, R Koerner. Association of Anaesthetists of Great Britain and Ireland. Safety guideline: skin antisepsis for central neuraxial blockade. *Anaesthesia* 2014; 69(11): 1279-1286.

## 03AP08-1

### The effects of analgesic and surgical techniques on postoperative inflammation and stress response following surgery for colorectal cancer. A randomized study

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**Background and Goal of Study:** Surgical trauma causes the release of both pro- and anti-inflammatory cytokines and suppresses cellular immunity with possible negative effects for the patient with malignant disease. The primary aim of this study was to examine if the choice of analgesic and surgical techniques influences the inflammatory and stress responses in patients undergoing surgery for colorectal cancer.
**Materials and methods:** The study was approved by the Regional Ethics committee in Linköping, Sweden. 97 patients scheduled for open or laparoscopic surgery were stratified (open vs laparoscopic) and randomized to Group E (thoracic epidural- based analgesia) or group P (systemic opioid-based morphine analgesia). Surgery and anaesthesia were standardized in both groups. Plasma cortisol, insulin and plasma cytokines (IL-1β, IL-4,IL-5, IL-6, IL-8,IL-10, IL-12p70, IL-13, TNFα, IFNγ, GM-CSF, PGE2 and VEGF) were measured preoperatively, 1-6 hours postoperatively (T1) and 3-5 days postoperatively (T2).
Mixed model analysis was used for cytokines and stress markers after logarithmic transformation if appropriate.
**Results and discussion:** There were no significant differences in pro-inflammatory cytokine levels between groups P and E at any time point. Plasma concentration of the anti-inflammatory cytokine IL-10 was 87% higher in group P (median value 4.1 pg/ml, (2.3-9.2)) compared to group E (median value 2.6 pg/ml (1.3-4.7)) (p=0.002) at T1.
There was no difference in plasma cortisol and insulin between the groups at any time point after surgery. Significant differences in plasma cytokine levels were, however, found between open and laparoscopic surgery with higher levels of IL-4, IL-6, IL-8, IL-13 and IL-10 at T1 in patients undergoing open compared to laparoscopic surgery. No differences in plasma cytokine levels were detected between analgesic or surgical technique at T2.
**Conclusion(s):** The choice of analgesic technique seems to have no major influence on postoperative stress or inflammation, but opioid-based analgesia for colorectal cancer surgery might enhance postoperative immune suppression. Open surgery for colorectal cancer as opposed to laparoscopic surgery leads to greater inflammation early in the postoperative period. The surgical trauma appears to be more important for the inflammatory response than the analgesic technique.

## 03AP08-2

### Prevention and treatment of the post-thoractomy pain syndrome in lung cancer surgery

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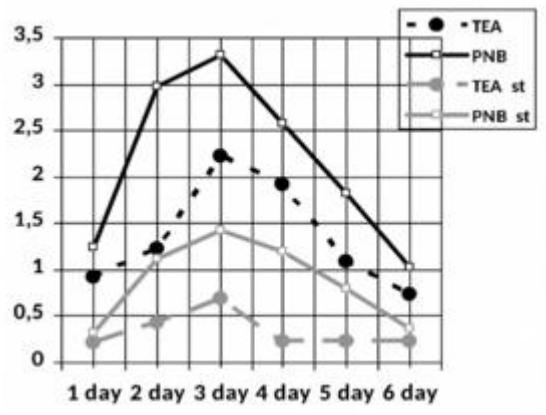
**Introduction:** Thoracic epidural analgesia has been considered the ‚gold standard' for pain management after thoracotomy. We aimed to compare efficacy and safety of thoracic epidural analgesia (TEA) versus paravertebral nerve block (PNB).
**Methods:** 70 patients (54±7,3 years), ASA I-III undergoing open lung surgery were randomized into two groups: Group E received TEA; group P received PNB. In group E patients were infused with standard analgesic solution 4-8 ml/h (0,33% ropivacaine, fentanyl 4 μg/ml, adrenalin 2 μg/ml). In group P paravetebral bolus dose (10 ml - 2 % lidocaine; 22 ml of standard analgesic solution) was administered before skin incision. Patients received combined anesthesia with sevoflurane, fentanyl, ketamine. Postoperatively they received infusion of standard analgesic solution, 4-6 ml/h in E group and 8-12 ml/h in P group during first 2 days. Then they recieved 0,2% ropivacaine alone during next 4 days. All patients received postoperatively NSAIDs, nefopam, pregabalin, morphine.
**Results:** The total intraoperative dose of fentanyl was not different between the groups. But from the 1-st to 5-th postoperative days the total doses of rescue analgesics were higher in P group than that in E group (Tab.1). The degree of pain at the first 5 postoperative days in P group was higher than that in E group at rest and during movement. But at the 6-th postoperative day the degree of pain did not differ between the groups (Pic.1). Postoperatively in E group 5 patients showed hypotension where as in P group 1 patient met homodynamic disorders (p=0,09). We did not find significantly differences at the frequency of urinary disoders.

| Day | Morphine mg/kg/day | | TEA *p*-value |
|---|---|---|---|
| | TEA (n=35) | PNB (n=35) | |
| 1 day | 0,034 ± 0,068 | 0,149 ± 0,170 | < 0.001 |
| 2 day | 0,143 ± 0,078 | 0,222 ± 0,074 | < 0.001 |
| 3 day | 0,151 ± 0,082 | 0,243 ± 0,066 | < 0.001 |
| 4 day | 0,125 ± 0,093 | 0,210 ± 0,162 | 0.004 |
| 5 day | 0,0618 ± 0,09 | 0,179 ± 0,254 | < 0.001 |
| 6 day | 0,017 ± 0,063 | 0,0495 ± 0,066 | 0.052 |

*[Table 1. Postoperative opioids requirement]*




*[Picture 1. NRS for degree of pain in postoperative]*

**Conclusions:** Both methods of regional anesthesia were effective. Pain syndrom was not higher then 3,3 grades of NRS. But thoracic epidural anesthesia was significantly better then paravertebral nerve block in postoperative analgesia.

## 03AP08-3

### Safety of post-anesthesia care unit discharge without motor-function assessment after total hip - or knee arthroplasty under spinal anesthesia

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**Background and Goal of Study:** The post-anesthesia care unit (PACU) is a specialized and resource demanding hospital unit where admittance, observation and treatments needs to be evidence based to facilitate patient recovery and optimal utilization of resources, without compromising patient safety. The focus on this critical phase in the recovery phase after total hip- or knee arthroplasty (THA/TKA) is sparse, but a large potential for optimization of discharge criteria have been suggested including no need for observation for motor blockade after spinal anesthesia[1]. However, no studies have investigated the safety of such altered discharge criteria. Thus we designed a trial to assess the safety of not assessing motor-function after spinal anesthesia for THA or TKA.
**Materials and methods:** Adult patients scheduled for spinal anesthesia for THA or TKA were included in a randomized prospective trial. Patients were observed in PACU by standardized discharge criteria except motor-function. At discharge readiness where randomized to "no motor-function" vs. "motor-function" observation and discharged accordingly.
Any adverse event requiring medical staff contact during the first 24 hours where recorded. Primary outcome was differences in frequency of adverse events. Secondary analysis included; time in PACU, time from spinal anesthesia to adverse events and distribution of adverse events between groups.
**Results and discussion:** 1511 patients were included with 1360 follow-up (90%), 670 in control vs 690 in intervention group. 94 patients (7%) had an "adverse event" after PACU discharge predominantly related to pain, circulatory and cerebral circumstances, but without significant differences between groups (6.0% vs 7.5%, $p = 0.28$). PACU stay was significantly shorter in intervention group (1:45 vs. 0:30 hrs., $p < 0.001$).19% of adverse events occurred from 0-6 hours after spinal anesthesia administration, 30% between 6-12 hours and 51% >12 hours, without significant differences in type of adverse events ($p = 0.68$) between groups.
**Conclusion(s):** Discharge from after spinal for THA or TKA PACU without motor-function assessment is safe with significantly reduced time in PACU stay. The majority of adverse events occur >6 hours post-spinal anesthesia.
**Reference:**
2. Lunn TH, et al. Post-anaesthesia care unit stay after total hip and knee arthroplasty under spinal anaesthesia. *Acta Anaesth Scand* 2012;56:1139-1145.

## 03AP08-4

### Regional scalp nerve block provides better blood pressure control for cervicle spine surgery

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**Background and Goal of Study:** There are several previous studies demostrating that regional scalp nerve block provides better hemodynamcis, acute and chronic pain control for brain surgery. Many cervicle spine surgery also require cranial fixation which often cause significant hemodynamic change. Aim of this study is to exam if scalp nerve block provides similar benefit as well.
**Materials and methods:** We reviewed all consecutive adult patients underwent elective cervical spine surgery during 2015/05 and 2015/10. All patients recieved endotracheal general anesthesia induction with fentanil, propofol/ thiamylal and cisatracurium/ rocuronium followed by sevoflurane/ desfurane/ propofol maintainance. If a patient was selected to recieve regional scalp nerve block by his/ her anesthesiologist, 0.5% levobupivacaine or 2% lidocaine about 3ml was injected each side for auriculotemporal nerve after general anesthesia induction. We do not perform occipital nerve block to avoid possible cervicle nerve damage when positioning. Heart rate and blood pressure were monitored during cranial fixation, if significant hemodynamic change was noticed, increasing anesthesia depth and/ or adding fentanil/ antihypertensive drugs was selected by the anesthesiologist.
**Results and discussion:** During these six months, there were 109 elective adult cervical spine surgeries, 47 of them required cranial fixation. All 47 were put into prone position with head fixed with Mayfield skull clamp. Thirteen patient recieved regional scalp nerve block and 34 didn't. The baseline HR, SBP, DBP were 79 vs 78, 148 vs 138, 78 vs 84 in control and nerve block group. During cranial fixation, the HR, SBP, DBP were 89(+13%) vs 86(+10%), 128(-14%) vs 115(-17%), 81(+4%) vs 71(-15%) in control and nerve block group. The DBP change value and percentage were both significantly different(p-value 0.02 and 0.03).There was no adverse event caused by regional scalp nerve block.
**Conclusion:** In patients with regional block to auriculotemporal nerve, the hemodynamic contorl, especially DBP is better than patients without regional scalp nerve block. It is an effective and safe technique for cervical spine surgery requring cranial fixation.
**References:**
1. Regional Scalp Block for Postcraniotomy Analgesia: A Systematic Review and Meta-Analysis. Anestheisa and Analgesia 2013;116:1093-102
2. A Review of Scalp Blockade for Cranial Surgery. Journal of Clinical Anesthesia 2013;25:150-9.

## 03AP08-5

### Do you really have a metallic taste? A survey about symptom recognition and treatment of local anesthetic toxicity in a university hospital

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**Background and Goal of Study:** Local anesthetics are drugs widely used by surgical specialists to perform invasive techniques without the supervision of an anesthesiologist. However, local anesthetic systemic toxicity is potentially fatal. Identifying intoxication symptoms and early administration of lipid emulsion are essential for its treatment. The goal of this study is to identify the level of knowledge regarding the symptoms and treatment of local anesthetic toxicity among non-anesthesiologist specialists in our hospital.
**Materials and methods:** After the approval of the project by the management and the unit of quality improvement of the hospital, a survey was conducted among professionals from our center (a tertiary university hospital that serves a population of 500,000 in all surgical specialties except for cardiac surgery). This survey was available on the hospital's intranet in May 2015. The survey included 6 questions about the symptoms and treatment of local anesthetic intoxication. Responses were treated anonymously, excepting for the specialization of the practitioner (anesthesiologist - non-anesthesiologist). The differences between the 2 groups were analyzed by the Fisher test for dichotomous variables. Statistical analysis was performed using JMP v12.0 (SAS Institute Inc., USA).

**Results:** 58 professionals (14 anesthesiologists and 44 non-anesthesiologists) responded to the survey. Significant differences were found between the groups when identifying a metallic taste as an initial symptom of toxicity, the specific characteristics of bupivacaine intoxication, the cardiologic safety profile of levobupivacaine and the intravenous infusion of lipid emulsion as treatment (table 1).

| | Anesthesiologist | Non-anesthesiologist | p-value |
|---|---|---|---|
| Identifying metallic taste as a prodrome | 92.80% | 54.71% | 0.0074 |
| Mepivacaine: Identifying neurological symptoms | 42.86% | 23.68% | 0.1759 |
| Bupivacaine: Identifying cardiological symptoms | 78.57% | 38.46% | 0.0084 |
| Levobupivacaine: Identifying cardiological safety | 61.54% | 16.67% | 0.0029 |
| Identifying lipid emulsion as treatment | 100% | 62.79% | 0.0071 |
| Identifying where the lipid emulsion is placed | 100% | 93.75% | 0.39 |

*[Table 1. Differences analyzed by the Fisher test]*

**Conclusions:** There are significant differences between anesthesiologists and non-anesthesiologists when identifying the symptoms and treatment of intoxication by local anesthetics. Therefore educational measures, focused on non-anesthesiologists, must be developed.

## 03AP08-7

### Comparison of haemodynamic changes and postoperative outcomes between regional anaesthesia with dexmedetomidine sedation and general anaesthesia in patients undergoing carotid endarterectomy: a retrospective pilot study

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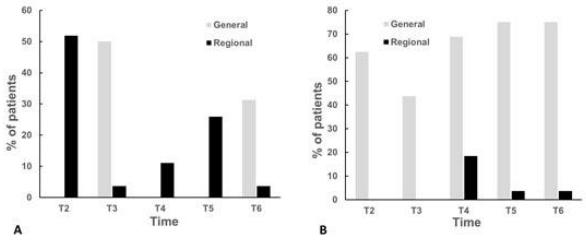
**Background and Goal of Study:** Carotid endarterectomy (CEA) has been performed under either regional (RA) or general anaesthesia (GA). The GALA trial concluded that the choice of an aesthetic technique does not affect the perioperative outcome [1]. However, there have been improvements in local anaesthetic, sedative, a BP-controlling drugs, together with advances in the medical devices [2]. The purpose of this pilot study was to test the hypothesis that haemodynamic stability and postoperative outcomes are better when performed with ultrasound-guided superficial cervical plexus block (UGSCPB) with dexmedetomidine sedation than with GA for CEA.
**Materials and methods:** We retrospectively investigated 43 adult patients who had undergone CEA at our institution between June 2012 and June 2015: n=16 in GA and n=27 in RA. GA was induced with propofol and maintained with sevoflurane. UGSCPB was done with 8-12 ml of 0.375-0.5% ropivacaine. Loading dose of 1.0 mcg/kg dexmedetomidine was administrated over 10 min before incision. The maintenance infusion rate was started at 0.5 mcg/kg/hr and titrated by BIS 60-80. We described frequency and timing of haemodynamic drugs administration during surgery. Postoperative outcomes were also compared.
**Results and discussion:** Duration of surgery, anaesthesia, and clamping were longer and shunt use was more frequent in GA. Antihypertenstive drug was similarly used, however, antihypotensive drug was more frequently used in GA. 51.9% of patients in RA required anti-hypertensive drug during loading dose of dexmedetomidien, while 50% of patients in GA required it during skin incision. Infusion of antihypotesive drug was required in 75% of patients in GA.




*[Fig 1. Frequency and timing of antihypertensive (A) and antihypotensive (B) agents administration during surgery. T0 = before anesthesia, T1 = after cervical plexus blockade or intubation, T2 = during administration of dexmedetomidine loading dose or after induction, T3 = at skin incision, T4 = before carotid artery cross-clamping, T5 = after carotid artery cross-clamping, T6 = at the end of the operation or at extubation]*

Postoperative haemodynamic profiles were not different. Postoperative 24 h NRS and frequency of overall complications were significantly higher and hospital stay were significantly longer in GA.
**Conclusion(s):** This pilot study suggests that UGSCPB with dexmedetomidine sedation provides greater intraoperative haemodynamic stability and postoperative outcomes compared with GA during CEA.
**References:**
1.Gough et al. Trials 2008;9:28
2. Stoneham et al. Br J Anaesth. 2015;114:372-83

## 03AP08-8

### Current trends in regional anesthesia: a survey on Portuguese anesthesiologists motivation and practice

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**Background and Goal of Study:** The use of Regional Anesthesia (RA) techniques, particularly peripheral nerve blocks, has gained increasing popularity as part of Anesthesia and Pain management.
The purpose of this study was to determine the factors affecting the practice of regional blocks among the Portuguese Anesthesiologists.
**Materials and methods:** A 41-item questionnaire named "The Practice of Regional Anesthesia Questionnaire" (PRAQ) was designed through a focus group event followed by a Delphi process. The PRAQ is composed of 4 scores: motivation, advantages, training and barriers. Each score includes 8, 10, 5 and 9 questions and the questions were rated on a 5 point Likert scale. The questionnaire was sent by email to Anesthesiologists of 25 Portuguese Hospitals. Statistical analysis was performed with SPSS22.0 and Epi Info (significant level $\alpha=0.05$).
**Results and discussion:** 173 Anesthesiologists answered the questionnaire. 70 (41.5%) were specialists in Anesthesia for less than 10 years. When compared with Anesthesiologists working for 10 or more years, the younger achieved higher scores on motivation and advantages ($p<0.05$). 43.4% of Anesthesiologists were members of a RA Society which denote a special interest in this area. Comparatively to the non-members group, members were more motivated and exhibit more versatility in RA techniques ($p<0.05$). This group considered that experience in RA is determinant in the choice of type of anesthesia. 52% of responders didn't execute regional blocks in children due to inadequate training. The opinion about the barriers to RA didn't differ between the Anesthesiologists. 64% didn't believe that RA delays the starting times of surgeries or the time for discharge from a post-anesthesia care unit. For 32 Anesthesiologists the pressure employed by other professionals influenced the choice of anesthetic technique. 91.9% considered ultrasound guidance increased the safety of RA and 56.6% prefer the application of ultrasound to regional blocks.
**Conclusion:** Most Portuguese Anesthesiologists were motivated and interested in RA. Training programs must be implemented to turn RA in a competency of every Anesthesiologist. The questionnaire responders considered that the acquisition of competencies in advanced RA techniques adds value to the Anesthesiology Department.

## 03AP08-9

### Total joint replacement and blood loss: regional or general anesthesia? Which is best?

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**Background and Goal of Study:** In total joint replacement, regional anaesthesia (RA) seems to have several potential advantage over general anaesthesia (GA). It is clamed to reduce intraoperaive bleeding, the need for transfusion and the the lenght of hospital stay (1). We intend to infer how these techniques can influence the outcome of our patients.
**Materials and methods:** In this retrospective study, we reviewed all the elective total hip replacement (THR) and total knee replacement (TKR) in our hospital (Unidade Local de Saúde de Matosinhos), during one year (2014-2015), consistinf of 246 patients, to compare the relationship between regional vs general anaesthesia and intra/pos-operative blood loss, transfusion requirement and lenght of hospital stay. All reported P values are two-tailed, with a P value of 0,05 or 0,01 indicating statistical significance. Analyses were performed with the use of SPSS software, version 22.
**Results and discussion:** 246 patients were included in this study: 62,2% female and mean age of 69 ± 9 years. In THR, RA was associated with smaller intra-operative blood losses, compared with GA. (233 ± 128ml and 326 ± 146 ml, RA vs GA, $p < 0.05$). The same did not happen in the TKR and 24 hours post-surgery in both groups ($p > 0.05$). No association was found between the need for transfusion and anesthetic technique ($p = 0.5$). The anesthetic technique did not influence the length of stay (7.20 ± 3.2 and 7.18 ± 2.0 days, RA vs GA; $p = 0.8$).
**Conclusion(s):** Some studies are not consistent with the advantages of RA in TJR. In this study we did not find a clear advantage of one technique over the other. However, in THR, it seems that regional anesthesia can reduce blood loss intraoperatively. Nevertheless, larger studies are needed.
**Reference:**
1. The jornal of Bone and join surgery, No. 7, 935-42, 2009 July.

## 03AP08-10

### The effect of continuous wound infusion with ropivacaine and methylprednisolone on peripheral and systemic oxidative stress. Preliminary data of a phase III RCT

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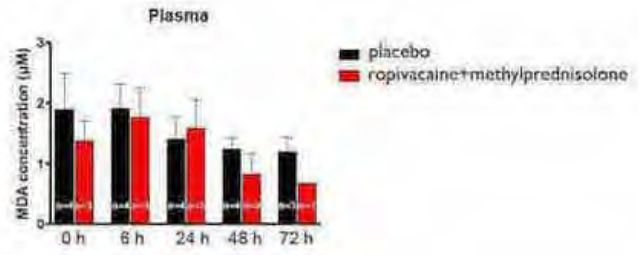
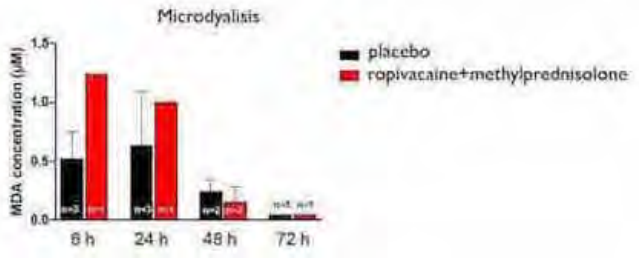
**Background and Goal of Study:** Continuous wound infusion (CWI) of local anesthetics (LA) reduces postoperative morphine consumption[1]. Oxidative stress (OXs) and inflammation are major features of pains[2,3].
We investigate efficacy of CWI with LA+methylprednisolone on peripheral and systemic OXs after major abdominal surgery.
**Materials and methods:** Following a 24 hours CWI of ropivacaine 0.2%+methylprednisolone 1mg/kg (+iv morphine PCA), patients were randomized to receive CWI either with ropivacaine 0.2%+methylprednisolone 1mg/kg (*Group A*) or placebo (*Group B*) for postoperative analgesia (+iv morphine PCA). OXs was analyzed peripherally (wound micro-dialysis) and systemically (plasma) at 1 hour, 6 hours, 24, 48 and 72 hours, through the determination of malondialdehyde (MDA) with thiobarbituric acid assay.
**Results and discussion:** We present preliminary results of a PHASE III, double-blind RCT (NCT02002663). We enrolled 7 patients. Systemic OXs levels are reported in *Figure 1*, while peripheral OXs is displayed in *Figure 2*.




*[MDA Plasma]*




*[Wound MDA]*

**Conclusion(s):** Peripheral nociceptive block, combined with local administration of steroid seems to reduce the levels of oxidative stress within the wound; the same result has not been observed systemically. Once confirmed with bigger sample size, our results may argue towards the protective modulation of CWI on molecular mechanisms involved in hyperalgesia and central sensitization.
**References:**
1. Lavand'homme, P.,*Improving postoperative pain management: Continuous wound infusion and postoperative pain.* Eur J Pain Suppl, 2011. **5**(2): p. 315-512.
2. Burian, M. and G. Geisslinger,*COX-dependent mechanisms involved in the antinociceptive action of NSAIDs at central and peripheral sites.* Pharmacol Ther, 2005. **107**(2): p. 139-54.
3. Wang, Z.Q., et al.,*A newly identified role for superoxide in inflammatory pain.* J Pharmacol Exp Ther, 2004. **309**(3): p. 869-78.

## 03AP09-1

### RAPID study: low dose spinal versus hemi-spinal anaesthesia in fast-track surgery in patients receiving a primary total hip arthroplasty. Preliminary results of a prospective randomised controlled study

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**Background and Goal of Study:** Spinal (S) and hemi-spinal anaesthesia (HS) are two common methods in total hip arthroplasty (THA). The aim of this RCT is to evaluate whether low dose S or HS anaesthesia would provide better perioperative anaesthesia.
**Materials and methods:** Demographic characteristics, conversion, opioid intervention perioperative, Length of stay (LOS) PACU, postoperative pain (VNRS) and LOS in hospital were measured. To compare treatment outcomes in both groups we applied t-tests for continuous measures and Chi $^2$ tests for categorical measures and logistic regression. P-values <.05 were statistically significant.
All patients received low dose S (7.5 mg: 0,5% bupivacaine plain) or HS (7.5 mg: 0,5% hyperbaric bupivacaine), sedation with propofol and multimodal opioid-sparing regimen.
**Results:** A total of 175 patients were analysed, 86 received S and 89 HS. In both groups about 56% was operated by the anterior approach and 44% by the posterolateral approach, with no significant difference between groups. Mean age was 76.3 ± 10.4 (range 37- 94 yrs), 34.4 % were female, Mean BMI was 27.9 ± 4.7 (range 18.8-42.6), ASA scores were I=27.4%, II=62.3%, III=10.3%. No differences in demographics were found between groups. Significantly more patients with HS were converted to general anaesthesia and more patients in the HS group received opioids perioperative (S 5.8% vs HS 16.9% and S 9.3% vs HS 14.6%). The mean time between placing S or HS anaesthesia and starting surgery was significantly longer in patients receiving HS (S 15 ± 5 and HS 47 ± 16 minutes) and this delay was significantly
(p <.001) related to the need for additional anaesthesia (conversion or opioids). The mean LOS PACU was significant longer in the S group than in the HS group (79 ± 46 vs 40 ± 23 minutes, p<.001). There was no difference between S and HS in postoperative pain. The highest mean VNRS scores during the first three days varied between 2.1 and 2.6. The mean LOS in hospital did not differ between groups
(S 45 ± 25 vs HS 49 ± 47 hours) Low dose S and low dose HS in combination with sedation and a multimodal opioid-sparing regimen provide adequate anaesthesia in primary THA.
**Conclusion:** This study showed significant differences in conversion and opioid intervention rates between S and HS, which can be attributed to a delay, i.e. the time between placing S or HS and starting surgery. Optimizing logistics in HS anaesthesia might solve this disadvantage.

## 03AP09-2

### RAPID study: low dose spinal versus hemi-spinal anaesthesia in fast-track surgery in patients receiving a primary total knee arthroplasty. Preliminary results of a prospective randomised controlled study

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**Background and Goal of Study:** Spinal anaesthesia (S) and hemi-spinal anaesthesia (HS) are two common anaesthesia methods in total knee arthroplasty (TKA). The aim of this RCT is to evaluate whether low dose spinal or hemi-spinal anaesthesia would provide better perioperative anaesthesia.
**Materials and methods:** Demographic characteristics, conversion, opioid intervention perioperative, Length of stay (LOS) PACU, postoperative pain (VNRS, highest score per day) and LOS in hospital were measured.To compare treatment outcomes in both groups we applied t-tests for continuous measures and Chi$^2$ tests for categorical measures. P-values <.05 were considered statistically significant. All patients received low dose S (6.0 mg: 0.5% bupivacaine plain) or HS (6.0 mg: 0,5% hyperbaric bupivacaine), sedation with propofol and a multimodal opioid-sparing regimen.
**Results:** A total of 123 patients were analysed, 63 received S and 60 HS. Mean age was 69.88 ± 9.8, 56.1% were female, Mean BMI was 29.6 ± 5.2, ASA scores were I=22%, II=63.4%, III=14.6%. No differences in demographics were found between groups. No significant differences were found between the S and HS group in conversion to general anaesthesia (S 4.8% vs HS 6.7%) or intervention with opioids perioperative (S 6.3% vs HS 8.3%). The mean time between placing spinal or hemi-spinal anaesthesia and starting surgery was significantly longer in patients receiving HS (S 16 ± 30 vs HS 43 ± 16 minutes). This delay did not influence the outcome for additional anaesthesia in both groups.
There was no difference in the mean LOS PACU between both groups (S 54 ± 45 vs HS 49 ± 41 minutes).There was no difference between S and HS in postoperative pain. The highest mean VNRS scores between S and HS were respectively 2.8 vs 2.8 at day 0, 3.8 vs 3.6 at day 1 and 3.8 vs 3.6 at day 2. There was no difference regarding LOS in hospital (S vs HS: 68 ± 42 vs 64 ± 34 hours).
**Conclusion:** Low dose S or HS in combination with sedation and a multimodal opioid-sparing regimen both provide adequate anaesthesia in primary TKA. This study showed no differences in perioperative outcome between S and HS in TKA.
Postoperatively, all VNRS scores were low, but we found a slight increase at day 1 and 2. This may call for reconsideration regarding our local anaesthetic regimen and perioperative analgesia.

## 03AP09-3

### Internal jugular vein anteroposterior diameter respirophasic variation measured by ultrasound can predict the risk of hypotension following spinal anaesthesia

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**Background and Goal of Study:** Spinal anaesthesia is a safe and simple method of providing satisfactory conditions for surgery. However hypotension secondary to spinal anaesthesia is one of the most frequent effects with a reported incidence of up to 33% potentially leading to cardiovascular instability and difficult anaesthetic management. Therefore, predicting hypotension may help in proper management of the anaesthesia.
The aim of our study was to identify whether an ultrasound assessment of the internal jugular vein (IJV) might help predict the risk of hypotension following a spinal block.
**Materials and methods:** Our study was approved by the Bioethical Committee of the Warsaw Medical University. Twenty seven patients ASA I-II scheduled for lower limb joint replacement surgery were included in the study. All patients brought to a preanaesthetic area had baseline measurements of the right IJV in a standardised supine position using m-mode ultrasound imaging. The maximum and minimum anteroposterior diameter of the vein during normal spontaneous breathing was recorded and blood pressure was measured at this time. After spinal anesthesia was performed using 3 to 3,5ml 0,5% bupivicaine heavy spinal, non invasive blood pressure measurements were carried out every 5 minutes during a 30 minute period. A systolic blood pressure drop below 90 or more than 30% from the baseline value was considered to be substantial. The percentage change between the anteroposterior diameter of the IJV during spontaneous breathing was compared between the group of patients with non substantial blood pressure change and the group with noted hypotension using the Mann-Whitney U test.
**Results and discussion:** Ten patients with a substantial blood pressure drop had a larger difference between the maximum and minimum anteroposterior diameter of the right IJV expressed as percentage change (median value 26%, Q1-Q3 24%-40%) compared to seventeen patients in the group with a non substantial change in blood pressure (median value 17,3%, Q1-Q3 11%-22,7%) and this difference was statistically significant (p - 0,047). Ultrasound measurement of the IJV diameter was simple and did not require expert skill.
**Conclusion(s):** IJV calibre variation during spontaneous breathing can help predict hypotension following a spinal anaesthesia and the ease of use facilitates its implementation into everyday use.

## 03AP09-4

### Haemodynamic changes in patients with cardiovascular diseases under low-dose spinal anaesthesia during anorectal surgery assessed by impedance cardiography in lithotomy or jack-knife position

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**Background and Goal of Study:** The prone position for anorectal surgery is required to provide better exposure but can cause a reduction of cardiac output (CO) and cardiac index (CI)[1]. The aim of this study was to compare changes of haemodynamic parameters assessed by impedance cardiography of patients with cardiovascular diseases (ASA class 3) under selective spinal anaesthesia during anorectal surgery in lithotomy or jack-knife position.
**Materials and methods:** approved by local Ethics Committee, the prospective observational study included 48 adult patients with co-morbidities (ASA class 3) admitted for elective anorectal surgery, randomly assigned to be performed in lithotomy (groupL, n=24) or jack-knife position (groupJ, n=24). After arrival to operating room the standard and impedance cardiography monitoring was started and the following variables were recorded: CO, CI, systemic vascular resistance (SVR), systolic index (SI), measured at times of arrival to OR, placement for, start and end of surgery, placement to bed. Selective spinal block was made with 4mg of 0.5% hyperbaric bupivacaine and 10μg of Fentanyl. Comparison was based on haemodynamic changes between and inside groups over time.
**Results and discussion:** Data are presented as mean±SD, *p<0.05 considered as statistically significant group J vs group L:

| Variable | Group | Baseline OR | Laid for surgery | Start of surgery | End of surgery | Placed to bed |
|---|---|---|---|---|---|---|
| CO (l/min) | L | 6.1±1.4 | 6.8±1.4 | 6.4±1.5 | 6.2±1.5 | 5.6±1.0 |
| CO (l/min) | J | 6.2±1.5 | 3.1±0.9* | 3.0±0.8* | 3.1±0.7* | 5.5±1.0 |
| CI (l/min/m$^2$) | L | 3.2±0.7 | 3.4±0.5 | 3.3±0.6 | 3.3±0.7 | 3.0±0.6 |
| CI (l/min/m$^2$) | J | 3.3±0.6 | 1.8±0.6* | 1.7±0.4* | 1.7±0.4* | 3.1±0.4 |
| SI (ml/m$^2$) | L | 42±11 | 46±8 | 47±9 | 47±12 | 42±9 |
| SI (ml/m$^2$) | J | 46±10 | 25±9* | 23±7* | 25±8* | 39±8 |
| SVR (dynes/sec/cm$^{-5}$) | L | 1686 ±594 | 1511 ±639 | 1463 ±622 | 1465 ±637 | 1552 ±584 |
| SVR (dynes/sec/cm$^{-5}$) | J | 1683 ±732 | 2698 ±1061* | 2821 ±1296* | 2608 ±900* | 1701 ±584 |

*[Haemodynamic changes]*

Changes of all hemodynamic variables over time were statistically significant inside both groups, except SpO2 and mean BP and HR.
**Conclusion(s):** According to impedance cardiography, jack-knife position produces significant changes of haemodynamic parameters and is not recommended for patients with cardiovascular diseases, compared to insignificant changes in lithotomy position.
**Reference:**
1. Edgcombe H, Carter K, Yarrow S. Anaesthesia in the prone position. British Journal of Anaesthesia 2008 February 01;100(2):165-183.
**Acknowledgements:** The authors would like to thank the nurse anaesthetists Juzėnaitė A, Kulikauskaitė E, Pavlova O and OR staff for support and patience during the study.

## 03AP09-5

### Preloading with crystalloids vs intramuscular ephedrine for protection from lower cardiac output after spinal anesthesia in patients undergoing total hip replacement surgery: a randomised pilot study

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**Background and Goal of Study:** Both crystalloid preloading and intramuscular ephedrine are used in clinical practice for preventiving arterial hypotension secondary to spinal anesthesia. The goal of this study was to investigate whether any of these interventions may be more effective in protecting from significant decreases in cardiac output during the first 30 minutes after performing spinal anaesthesia for total hip replacement.
**Materials and methods:** Patients scheduled for elective hip replacement surgery were randomly assigned to receive either one litre of crystalloid intravenously (group 1, n=9) or 25mg ephedrine intramuscularly (group 2, n=10) prior to performing spinal anaesthesia. Cardiac output (CO) and corrected flow time (FTc) measurements were recorded with one minute intervals for 30 minutes from directly before anaesthesia using ICON™ (Osypka medical) portable noninvasive hemodynamic monitor. A decrease of more than one standard deviation (SD) from baseline measurement was considered significant.
**Results and discussion:** Mean CO values before anaesthesia were 5.01+/-1.38 in group 1 and 4.87+/-1.06 in group 2. Patients from group 1 with crystalloid preloading tended to experience more often a significant decrease in CO from baseline (41% vs 20% of time points, p=0.087). Mean baseline values of FTc were 331+/-20 and 312+/-26 respectively. Significant decrease in FTc from baseline was also more frequent in group 1 (40% vs 17%,p=0.050).
**Conclusion(s):** Preloading with crystalloid might be less effective in protecting from falls in cardiac output secondary to spinal anesthesia when compared to slow absorbing intramuscular ephedrine. However, the ongoing study may allow to draw stronger conclusions.

## 03AP09-6

### Randomised comparison of spinal anaesthesia with bupivacaine or levobupivacaine for hip surgery in elderly subjects

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**Background:** Bupivacaine and levobupivacaine have similar pharmacokinetic and pharmacodynamic characteristics, and are used regularly in spinal anaesthesia. Whether potential differences in their haemodynamic and anaesthetic profiles could determine differential risk of complications in elderly subjects is controversial.
**Objectives:** To compare intrathecally administered levobupivacaine versus racemic bupivacaine through regional cerebral O2 saturation, anaesthetic parameters, postoperative cognitive status and neurological complications.
**Methods:** The trial was approved by the Ethics Committee (CEIC Corporació Sanitaria ParcTaulí, Sabadell) and the Spanish Agency on Medicines and Medical Devices, and in accordance with the Helsinki Declaration of 1975, as revised in 1983. The study was registered at the European Union Clinical Trials Register (EudraCT 2013-000846 -20) on April 9th, 2013 and at ClinicalTrials.gov (NCT01960543) on September 23rd, 2013.
The trial included 58 patients aged 70 or older undergoing surgery for hip fracture and requiring spinal anaethesia, who were randomized to receive bupivacaine or bupivacaine. The primary outcome was the proportion of intraoperative time with regional cerebral desaturation (≥20% reduction from baseline), as monitored by near -infrared spectroscopy. Secondary end points included hemodynamic parameters, level of sensitive and motor block, changes in Short Portable Mental Status Questionnaire, and neurological complications.
**Results:** No significant differences for regional cerebral oxygen saturation or other hemodynamic parameters were observed. Levobupivacaine showed significantly lower sensitive block at the start of surgery and motor block at 15 minutes. No differences in intellectual function were observed after surgery, but neurological complications were more frequent with bupivacaine (50% vs 21.4%, p=0.05). Lower baseline regional oxygenation of right hemisphere and minimum mean blood pressure increased risk for desaturation.

## 03AP09-7

### Modified 45-degree head-up tilt increases success rate of lumbar puncture in patients undergoing spinal anesthesia

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**Background and Goal of Study:** Lumbar puncture (LP) is one of the most common procedures performed in medicine. The aim of this prospective study is to determine the success rate of LP in lateral decubitus with 45-degree head-up tilt position, and compare it with traditional positions like sitting and lateral decubitus.
**Materials and methods:** Three hundred and thirty patients between 25 and 85 years of age who had undergone abdominal, urologic, and lower limb extremities surgeries were enrolled 300 patients were divided into three different groups. The LP was performed with a 25-G atraumatic needle, either in the standard sitting position (group S, n = 100), lateral decubitus, knee-chest position (group L, n = 100) or lateral decubitus, knee-chest position with a 45-degree head-up tilt (group M, n = 100). The free flow of clear cerebrospinal fluid (CSF) upon first attempt was considered to be evidence of a successful LP.
**Resultsand and discussion:** Total LP success rate was significantly higher in group M (85 %) than in groups S and L (70 and 65 %, respectively) (p = 0.004). When the significance between the groups was evaluated according to age, the increase in the LP success rate was not significant for ≥65 and <65 age groups. There were no differences among the three groups in terms of bloody CSF (p = 0.229) and the number of attempts before dural puncture (p = 0.052).
**Conclusions:** The lateral decubitus in knee-chest position with a 45-degree head-up tilt may be the preferred position for spinal anesthesia in young and elderly patients, due to the high success rate.

## 03AP09-8

### The urinary retention incidence after spinal anaesthesia with Lidocaine 2% and Bupivacaine 0.5%

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**Background and Goal of Study:** Spinal anaesthesia is quick, cost-efficient, and safe, and is the ideal solution for some surgeries such as Chriptochidi, Herniy and Hydrocele.The purpose of this study was performed to measure the incidence of urinary retention and to identify the factors which affect the incidence of urinal retention after spinal anaesthesia with Lidocaine 2% and Bupivacaine 0.5%.
**Materials and methods:** In this study are involved patients aged 18 to 65 years old. ASA I-II.The patients underwent Chriptochidi, Hydrocele and Hernie repair surgeries. Patients with prostate hyperplasia or urogenital pathologies (incontinence, cystoureteric reflux, know bladder retention) intraoperative blood loss>200 ml, pregnancy, alcohol or drug abuse, were excluded from the study. An eco of the bladder was done to the patients before the surgery and was noticed that it was empty because the patients had urinated before entering the operation room. Monitoring was standard with EKG, SAO2 and measurement of the blood pressure .The subarachnoid space was punctured with a 26 G Whitacre needle at L2/L3 or L3/L4 with Lidocaine 2%-3ml (60mg) or Bupivacaine 0.5%-3ml(15mg).
Data were analyzed using Student's test and Fisher's exact test to detect significant differences among the groups. Correlations among outcome parameters and using Pearson's correlation test. A -P value of <0.01 was deemed to be statistically significant.
**Results and discussion:** Number of patients was 90.87(96%) of them were males and 3 were females (4%). Retention was only noticed in men.Total i.v fluid administration was unexpectedly higher in patients who voided spontaneously in comparison with those who needed catheterization.Urinary retention leading to catheterization was required in 24 patients(26%).The incidence of urinary retention after spinal anaesthesia with Bupivacaine was significantly higher (42%,17 of 40 patients) than Lidocaine (14%, 7 of 50 .(P<0.01)Mean time (SD) between spinal puncture and urinary catheterization was 190 min(range 90-450min).Mean time between spinal puncture and spontaneous micturition was significantly longer (240 min(sd 60), range 60-450.P<0.0001).
**Conclusion:** We found an incidence of postoperative urinary retention of 26%. The incidence of urinary retention after spinal anaesthesia with Bupivacaine was significantly higher (42%patients) than Lidocaine (14%, (P<0.01).

## 03AP09-9

### A new method in spinal anesthesia approach; "semilateral spinal block"

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**Background and Goal of Study:** Ureteroscopy under spinal anesthesia is ideal for middle and distal ureteral interventions. However, the patients may experince pain in the proximal ureter. Also in unilateral spinal anesthesia may be pain in enterance of the urethra.
For this purpose, a new method named "semilateral spinal block" has been defined.
**Materials and methods:** Sixty adult patients (19-65 years old) accepted to attend to the study. The patients in the Group SL (n=30) were positioned with a 45 degree semilateral decubitus position between the operation table and the patient's back as operative side dependent and in the Group S (n=30) patients were positioned in the supine position after the spinal injections. The patients' backs were supported with the pre-prepared rolls and they were kept at this position for 10 minutes in the Group SL.
Hemodynamic values were recorded. Pain and satisfaction were asked to the patients.
**Results and discussion:** There was no pain at the enterance of the uretra and no surgical complication on operation side during the intraoperative period in all patients due to management of anesthesia. Hypotension was not seen after the spinal local anesthetic agent administered to the patients in the Group SL. There was a significant decrease in terms of MAP and HR at all times values (except 0.minute values) in Group S (p<0.05). A significant decrease was seen in terms of "two segment regression time" and ambulation time values in Group SL (p<0.05). At the postoperative period, all patients and surgeons were satisfied with the anesthetic technique in the face-to-face interviews in the Group SL.
**Conclusion(s):** In unilateral ureteroscopies, the establishment of a sensorial block level which will allow the surgical procedures extending to the proximal ureter to be performed with enhanced patient comfort within hemodynamic stability is desired. "Semilateral spinal block" technique is previously not applied in English literature may be regarded as a new spinal anesthetic approach in this aspect.

## 03AP09-10

### Maintenance of the parturient in the left lateral position after spinal anesthesia with plain levobupivacaine for cesarean section reduces hypotension: a randomized study

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**Background and Goal of Study:** Hypotension during spinal anesthesia is a main concern in cesarean delivery. We hypothesized that keeping parturients in a prolonged left lateral position before turning them to a supine position with left lateral tilt would reduce the incidence of hypotension without jeopardizing the quality of anesthesia.
**Materials and methods:** Randomized comparative unblinded prospective study. This randomized comparative prospective study was conducted at Gaziantep University Hospital between June and December 2011. Sixty parturients undergoing cesarean section were included. Patients were randomized to two groups: turning to the supine position with left lateral tilt immediately or 15 min after subarachnoid injection of 2.5 mL 0.5% plain levobupivacaine in the left lateral position. Loss of pinprick sensation to T6 was accepted as adequate for cesarean section, and surgery proceeded. Characteristics of anesthesia; incidences of hypotension, bradycardia, and other adverse events; and ephedrine use were assessed.

**Results and discussion:** Compared with the supine group, parturients kept in a lateral position for 15 min showed marked reductions in the incidence of hypotension (33.3% *vs*. 83.3%, *P* <0.001) and adverse events related to hypotension, such as nausea and vomiting (16.7% *vs*. 57.3%, *P* <0.001). In addition, ephedrine consumption per hypotension case was significantly reduced in the lateral group (5.4 ± 4.7 *vs*. 8.9 ± 5.8 mg; *P* <0.001).
**Conclusion(s):** Keeping parturients in the lateral position for 15 min before turning them to the supine position for cesarean section can provide reliable spinal anesthesia with a lower incidence and severity of hypotension and nausea/vomiting.

## 03AP09-11

### Intradural puncture using a hanging drop technique

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**Background and Goal of Study:** Severe complications after spinal anesthesia are rare, in a large prospective series (40640 spinal anesthetics)[1] only 6 patients out of 10000 reported neurologic injury lasting more than 3 months, in most cases it was associated with paresthesia during puncture or pain during injection, and it had the same topography as the parethesiae associated. The cause for theses neurologic symptoms remains undetermined, but possible explanations include direct neurotoxicity of local anesthetic, patient characteristics, muscle spasm and needle trauma.
We introduce a small modification in the spinal puncture technique to minimize needle trauma, we propose to advance the standard pencil-point needle without the stylet filled with a hanging drop of normal saline solution. Once the tip reaches the epidural space the drop will be aspirated into the needle giving you an indication of the proximity to the dura. We believe this modification will result in a needle tip farther away from the nerve roots and less likely to damage these nerves.
**Materials and methods:** Patients (n=20) scheduled for surgery under spinal anesthesia were observed during spinal needle insertion. The technique was performed under sterile conditions using a 25 G Whitacre needle, after the needle passed the first 2 centimetres, the stylet was removed and the needle was filled with normal saline until a drop of saline was observed hanging from the hub.
The needle was advanced until either suction of the drop or flow of cerebrospintal fluid (CSF) was observed. When suction was observed, the needle was further advanced until the flow of CSF
**Results and discussion:** Aspiration of the normal saline was observed in 18/20 of patients, no complications were recorded.
**Conclusion(s):** An overwhelming majority of our cases showed a positive result to our technique and we found no paresthesiae. It is a small study with no statistical significance, however it has the potential of avoiding long-term complications and we believe it deserves further consideration.
**References:**
1. Auroy Y et al. Serious complications related to regional anesthesia. Anesthesiology 1997
2. Evans RW. Complications of lumbar puncture. Neurol Clin. 1998

## 03AP09-12

### Spinal Anaesthesia in Outpatient Surgery: What's the Best Option: Prilocaine vs Bupivacaine

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**Background and Goal of Study:** The prilocaine is being used with more frequency in cases of ambulatory surgery in different specialities due their short acting as a local anesthetic in spinal anaesthesia and its low risk of transitory neurological symptoms. We designated a prospective study to compare the effectivity between 2% hyperbaric prilocaine vs 0.5% hyperbaric bupivacaine in surgery (Urology, Traumatology, Gynecology, Proctology and Abdominal Wall surgery).
**Materials and methods:** 70 patients were scheduled for surgery with spinal anaesthesia and randomized in two groups. Group A: n=35 (8-14mg 0.5% hyperbaric bupivacaine).
Group B: n=35 (40-60mg 2% hyperbaric prilocaine). The doses depended on duration and necessary level for surgery. In both groups the anesthesic was administred in seated position with the SPROTTE® cannula introducer 25Gx90-120mm.
The variables measured were:
1.- sensitive-motor blockade characteristics (the application, level, intensity and duration)
2.- Vital parameters (heart rate, NIBP).
3.-Time of spontaneous urination.
4.- Adverse side effects (followup, 24 hrs)
5.- elapsed time in the recovery room.
6.- Satisfaction surveys.
**Results and discussion:** The sensitive level was higher with bupivacaine than the prilocaine (p=0.04) (Influence of the doses and the patient position). Both groups were similar to reach T12 level, intensity and instauration time (p=0.07). The T12 level blockade was maintened by 60 minutes for prilocaine vs 120 minutes with bupivacaine.
The group A has lower instability haemodynamic changes (>20% basal changes before punction) and required lower IV ephedrine doses for maintenance medial blood pressure >60mmHg. The motor blockade regression was 135min vs 210min (all differences were statistical significants). The recovery room discharge was early in the prilocaine group. A urinary catheter had needed in 8 patients in group B. There were not recorded other complications. There were not differences in satisfaction surveys.
**Conclusion(s):** The 2% hyperbaric prilocaine was superior to 0.5% hyperbaric bupivacaine due to a shorter effect profile with a similar quality of blockade. The prilocaine gives more haemodynamic stability (ideal in patients with cardiopulmonary disorder). Lower urinary retention and early discharge. The prilocaine may be a better option in outpatient surgery in the different surgical specialities.

## 03AP10-1

### The utilization of interscalene block for total shoulder arthroplasty in the United States: a national registry analysis

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**Background and Goal of Study:** Total shoulder arthroplasty (TSA) is a major joint surgery most commonly performed for chronic degenerative glenohumeral joint disease and rotator cuff arthropathy. The number of TSA procedures performed in the United States has more than tripled from 2000 to 2008 and is expected to continue to increase rapidly. Dramatically increasing volume and cost of TSA suggest an increased clinical and policy-making impact of anesthesia care for TSA.
Interscalene block (ISB) is a common adjunct to general anesthesia for TSA, but the literature on its utilization is scarce. We aimed to explore anesthesia care for TSA in the United States, focusing on practice variations with ISB.
**Materials and methods:** We carried out a retrospective analysis of data from the National Anesthesia Clinical Outcomes Registry (NACOR). We analyzed patient, procedural, and provider data from 2010 to 2015. Case characteristics and clinical outcomes were compared using chi-squared or t-tests. We used logistic regression to identify associations of patient and case characteristics with the utilization of ISB. Geographic and annual data on utilization of ISB for TSA are presented graphically.
**Results and discussion:** There were 28,570 cases that met inclusion criteria, of which 41.6% and 58.4% did or did not receive an ISB, respectively. The utilization of ISB for TSA is not homogeneous across states. Age, American Society of Anesthesiologists physical status (ASA PS) classification, hospital facility type, time of day, urban versus rural patient zip codes, and case duration were identified as predictors of ISB use.
Among patients that received an ISB, the ASA PS score, hospital facility type, and urban versus rural patient zip codes were associated with the utilization of a perineural catheter for continuous blockade. In addition, ISB was associated with a decreased likelihood of extended stay in recovery area and decreased postoperative nausea or vomiting.
**Conclusions:** There is considerable geographic variation in the use of ISB for TSA across the United States. The limited outcome data suggest measurable

clinical benefits of ISB for TSA in reducing the frequency of postoperative nausea/vomiting and extended PACU stay. This study may serve as a baseline for assessment of changes in anesthesia care for TSA over time.

## 03AP10-2

### Intravenous dexamethasone 4 mg is equivalent to 10 mg in increasing the analgesic duration of interscalene block after shoulder arthroscopy

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**Background and Goal of Study:** Single shot interscalene block (ISB) provides excellent but time-limited analgesia after shoulder surgery. Ten mg intravenous (iv) dexamethasone prolongs this analgesic duration but a dose-related effect remains uncertain. This study measured the impact of dexamethasone 4 mg and 10 mg iv on the analgesic duration of a single-shot ISB for shoulder arthroscopy, compared to placebo. Our hypothesis was that both doses would have a similar effect.
**Methods:** We performed a prospective, double blind, randomized, placebo-controlled study in patients presenting for shoulder arthroscopy under regional anesthesia with ISB (20 mL of ropivacaine 0,5%). Patients either received: dexamethasone 4 mg iv (D4), dexamethasone 10 mg iv (D10), or a placebo (normal saline (NS)) at the time of block completion. The primary outcome was the duration of analgesia, defined as the time between onset of ISB sensory blockade and the first analgesic request. Pain interference with sleep and opioid use in the first 48 hours were also collected. Our primary outcome was analysed with a one-way ANOVA and a Student's t-test was used to compare treatment groups. A Kruskal-Wallis test was used for secondary outcomes.
**Results:** After obtaining ethical committee approval and written informed consent, 75 patients were randomized and 68 completed the study (D4: 23 patients, D10: 23 patients, NS: 22 patients). Duration of analgesia was significantly different between the three groups (D4: 22.20h [CI95% 17.51; 26.89], D10: 20.12h [IC95% 14.97; 25.27], and NS: 11.51h [IC95% 10.18; 12.86], p = 0.001). This difference was statistically significant for D4 and D10 compared to placebo ($p<0.000$ and $p = 0.002$, respectively) but not between D4 and D10 ($p = 0.54$). Pain interference with sleep during the first night and opioid consumption in the first 48h were lower in D4 and D10 groups, compared to placebo (tables 1 and 2).

| Median score [percentile 25;75] | NS | D4 | D10 | p |
|---|---|---|---|---|
| 1st night | 6.5 [5;8] | 1.5 [0;5.25] | 2.5 [0;5.5] | 0.000 |
| 2nd night | 3 [1;5] | 3 [1;6] | 2 [0;6] | 0.956 |

*[Table 1. Pain interference with sleep (score 0-10)]*

| Median daily dose [percentile 25;75] | NS | D4 | D10 | p |
|---|---|---|---|---|
| Day 1 | 0 [0;1.75] | 0 [0;0] | 0 [0;0] | 0.03 |
| Day 2 | 5 [2;8] | 2 [0;6] | 2 [1;5.25] | 0.12 |
| Day 3 | 3.5 [0.25;6.75] | 2 [0;5] | 1 [0;3.25] | 0.11 |

*[Table 2. Opioid consumption (mg hydromorphone)]*

**Conclusion:** Intravenous dexamethasone 4 mg prolongs the analgesic duration of single-shot ISB after shoulder arthoscopy in a similar fashion than 10 mg.

## 03AP10-4

### Ultrasound assessment of the brachial plexus anatomic variations

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**Background and Goal of Study:** The aim of our study was to describe anatomic variations in the arrangementof the nerves of brachial plexus nerves at the axilla using ultrasound. And to compare them at those of the JL Christophe (1).
**Materials and methods:** In 72 patients undergoing upper and lower limb surgery, we studied nerve arrangements with a two-step approach, combining: (A) static ultrasound image (cross-section) (B) Dynamic ultrasound identification from the axilla to the elbow following the paths of individual nerves.The anatomic variation was then classified selon JL Christophe classification
**Results and discussion:** We included 72 patients (100 axila), with a median age of 43 (range 21-78) yr and BMI of 23,7 (SD 3.5) kg $m^2$. Two patients had a BMI more than 30 kg $m^2$. 28 patients were examineted bilaterally.The sex ratio M/F (n) was 49/23 and the side ratio R/L(%) was 46 /54. Class A was found in 52%, class B in 13%, class C in 8% , class D in 0%, class E in 1%, class F in 9%, class G in 3%, class H in 2% and class I in 1% .Class Other ( new variations) was found in 11%. The anatomic variations were more frequent in men than women (55% vs 34 %) Radial nerve was the most difficult one to identify (70%). The number of arteries at the axilla was: one in 96%, two in 3% and three in 1%. For veins it was: one vein in 26%, two in 55%, three in 14% and four veins in 5%.In seven cases (7%) we observed that a big vein was located between axillary artery and ulnar nerve.In our study the normal anatomy was found only in 52% which is less than in the study of JL Christophe 65% and more less Partridge's (2) one (78%); and new variations were found. This finding must lead us to be stricter in our practice of regional anesthesia.The number and position of vessels is very important to know before block procedure in order to minimize the risk of vessel injury and intravascular injection. This risk is certainly higher when the number of veins is more or equal to three (19% of cases in our study).The number of injections and dose of local anesthetic depend on arrangement and distance between nerves:
**Conclusion(s):** Anatomic variations of the brachial plexus are more frequent than we think, which make Ultrasound required peopheral nerve blocks.
**Reference:**
1. J.-L. Christophe and al. Assessment of topographic brachial plexus nerves variations at the axilla using ultrasonography.British Journal of Anaesthesia 103 (4): 606-12 (2009)

## 03AP10-5

### The combination of interscalene block and general anaesthesia in order to achieve controlled hypotension for patients having arthroscopic shoulder surgery in a "beach chair"position

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**Background and Goal of Study:** The use of contolled hypotension, during arthroscopic shoulder surgery with a patient in a " beach chair " position is a commonly used technique with the theoretic benefit of better visualization, reduced blood loss and shorter than usual surgical time. Nevertheless, there is a dispute over the safety of controlled hypotension and the avoidance of cerebral ischaemia.
For theese surgical procedures, the patient can be either under general anaesthesia combined with interscalene block or under general anaesthesia. Cerebral oximetry has been already acknowledged as a useful neurophysiologic monitoring, which can demonstrate perioperative events of cerebral hypoxia. The purpose of this study was to evaluate contolled hypotension in patients under general anaesthesia and interscalene block and its effect on cerebral function as it was evaluated through cerebral oximetry.
**Material and method:** The study included 30 patients ASA I - II, who underwent arthoscopic shoulder surgery. The patients were divided in two groups: Group A (n=16), which was under general anaesthesia ( propofol and opioids ) and interscalene block performed under ultrasound guidance receiving 15 ml of ropivacaine, and Group B (n=14), which was only under general anaesthesia.

The goal of Mean Arterial Pressure was between <80 mmHg and >60 mmHg. The cerabral oximetry was recorded every 15 min, as well as the arterial pressure, the heart rate and the pulse oximetry.
**Results and discussion:** The indices of cerebral oximetry are comparable for the two groups (p = 0,6 ). Yet, the index of cerebral oximetry registers a downward trend as soon as the patient is positioned in the "beach chair " position in the first as well as in the second group ( p <0,001 ). The control of both the arterial pressure and the heart rate is better achieved in the "block group" ( Group A ). This is mostly obvious during the induction of general anaesthesia and the positioning of the patient in the "beach chair" position, with a statistically significant result (p<0,001). But, it seems that the values of cerebral oximetry depend on the values of the arterial pressure (p<0,001).
**Conclusion(s):** The combination of interscalene block and general anaesthesia is safe in order to achieve controlled hypotension for ASA I-II patients, who undergo arthroscopic shoulder surgery in a " beach chair " position.

## 03AP10-6

### Comparison of different doses and concentrations of bupivacaine and lidocaine combination for infraclavicular brachial plexus block

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**Background:** Allowing earlier establishment of total blockade and achieving long-lasting postoperative analgesia, infraclavicular block is considered to have low risk and high availability for patients. As indicated before in several studies, there is still a need for further dose-finding studies to determine the optimal dose and volume concentration of local anesthetics for brachial plexus blocks.
The aim of this study is to determine the duration of action and ideal effective doses of bupivacaine-lidocaine combination in different concentrations for infraclavicular brachial plexus block.
**Methods:** Following Ethics Committee approval and written informed consents, patients were randomized into 3 groups, consisting of 20 patients and applied 15 mL 0.5% bupivacaine- 15 mL 2% lidocaine to the first, 15 mL 0.5% bupivacaine- 15 mL 2% lidocaine with 30 mL saline to the second, 10 mL 0.5% bupivakain- 10 mL 2% lidocaine with 40 mL normal saline to the third group. Stimuplex HNS 12 was preferred as nerve stimulator with 1.0 mA, 2 Hz, 0.1 ms parameters. Onset and duration of motor and sensory blocks, additional analgesic requirements, postoperative Visual Analogue Scale (VAS) were recorded.
**Results and discussion:** Groups were similar according to demographics, time until operation after block, operation time, perioperative and postoperative hemodynamic parameters. Onset of sensory block was significantly longer in Group I than Group II and III (158.4±20.4 sec, 106.2±32.2 sec and 79.6±41.0 sec respectively). Motor block initiation time was significantly longer in group I than the other groups (209.3±34.3 sec, 141.4±30.5 sec and 120.8±45.6 sec respectively), (Table 1). Postoperative sensory and motor block performance time were significantly shorter in group I than the others (Table 2). Additional analgesic requirement rate was %50 in Group I. The VAS score at the postoperative 6$^{th}$ hour was significantly higher in Group I (2.6±0.8) compared to II and III (p<0.01). VAS score at the postoperative 6$^{th}$ hour in Group III was significanty higer than II (1.2±1.1 vs 0.2±0.4, respectively, p<0.05).
**Conclusions:** We observed that by increasing the volume of local anesthetic solution, the time for initiation of sensory and motor block may decrease and the duration of both sensory and motor block increases. We concluded that using decreased amount of bupivacaine-lidocaine combination to 60 mL, may cover the surgery and is efficient for postoperative analgesia.

## 03AP10-7

### Hemodynamic changes after interscalene brachial plexus block depending on its side

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**Background and Goal of Study:** Interscalene brachial plexus block (ISB) is a first choice method performing shoulder surgery or diagnostic procedures around the world. Despite this common procedure there are still many undesirable events concerning hemodynamic changes. Exact causes are not yet fully determined. The goal of our study is to find how hemodynamics of patient is affected by ISB depending on its side.
**Materials and methods:** We investigated 78 patients, who needed shoulder surgery. All subjects were in sinus rhythm, and no abnormalities were detected with medical history and physical examination. Patient exclusion criteria: refused consent of enrollment in the investigation; coexisting diseases that were likely to impact changes in hemodynamics during the surgery. After obtaining the approval from the Ethics Committee the patients were included randomly into 2 groups depending on operating side. Two equal groups of 39 patients underwent one side ISB. All patients received 0.5% 20 ml bupivacaine and 2% 20 ml lidocaine Ultrasound-Guided ISB. Hemodynamic changes were registered with impedance cardiography test and standard patient monitoring in various periods of operation for the first hour.
**Results and discussion:** The patient population included both sexes, median age was 42,3 years with the ASA physical status I and II, weight from 50 to 98 kg and height between 155 and 192 cm. We found statistically significant difference between left and right side block. Left side ISB caused lower cardiac index after 10, 20 and 40 min. Systemic vascular resistance index was lower in every stage after 10 min. Mean blood pressure was lower after positioning the patients, 20, 30 and 60 min. Drop in heart rate was observed after 20 and 40 min. in left side block group. Acceleration index was higher in left side group after 10, 20 and 30 min. There was no statistically significant differences concerning systolic index and cardiac output. ISB has a different effects to hemodynamics depending on the block's side. In respect to our hypotheses, we suggest that left ISB, possibly through extension of block to the stellate ganglion, alters the autonomic outflow to the central circulatory system more than right ISB.
**Conclusion:** Left side ISB has higher influence to hemodynamic changes during left shoulder surgery. To fully investigate the influence of ISB side to hemodynamic changes more studies should be carried out and reviewed systemically to get reliable results.

## 03AP10-9

### Survey of various anaesthetic techniques for upper limb surgery in a university hospital in the UK

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**Background and Goal of Study:** Effective pain relief is one of the key components in enhanced recovery. Our aim was to survey the anaesthetic practice for upper limb surgeries in the university hospital and to suggest an anaesthetic technique that would improve patients' experience and hence satisfaction. Secondary goal was to find out if adequate information was given to patients on various anaesthetic options.
**Materials and methods:** 61 patients were recruited into this prospective survey over a period of 4 months. Study groups included awake regional anaesthesia [RA] (38), general anaesthesia [GA] (16), combined general & regional anaesthesia (4) and local anaesthesia (3). Patients were explained the anaesthetic options and anaesthetic plan formulated. The survey was explained to the patients in the anaesthetic room and the questionnaire provided. Patients completed questionnaires either in the recovery or in the ward.
**Results and discussion:** Only 15% of patients in regional anaesthesia, 6% in general anaesthesia, 33% in local anaesthesia and none in combined regional & general anaesthesia groups were explained all the anaesthetic options. However, more than 80% of patients received leaflets. In regional anaesthesia group 10% experienced mild pain, 6% moderate pain and 8% severe pain intra-operatively which was addressed promptly while 8% experienced mild pain and 3% severe pain in post-operative period. In General Anaesthesia

group, 13% experienced mild pain, 19% moderate pain and 31% severe pain in postoperative period. There was no difference in the incidence of nausea and vomiting.
**Conclusion(s):** Now we aim to provide clear explanation and documentation of all anaesthetic options to all the patients along with leaflets. It is good medical practice and Information helps them to make decisions and avoid contentions and litigations. In our survey, 100% of patients were satisfied with regional anaesthesia alone or combined with GA for their procedure as compared to 94% having GA alone. They would choose the same technique again and recommend it to their friends & family. The benefits of regional anaesthesia in enhanced recovery and prevention of peri-operative pain is well established. We recommend more use of regional anaesthetic techniques.
**Reference:**
Ramprasad Sripada. Clifford Bowens. Regional Anaesthesia Procedures for Shoulder and Upper Arm Surgery Upper Extremity. Update. International Anaesthesiology Clinics. 2012. Volume 50, Number 1, 26-46.

## 03AP11-1

### Epidural analgesia in a labour parturient with Tinea versicolor: a rare case without enough literature

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**Background:** Epidural analgesia is formally contraindicated in case of infection in the insertion site due the possibility of a iatrogenic neuroaxial infection. Tinea versicolor is a fungal infection of the skin, caused by *Malassezia Furfur*, which is a sprophite in the skin. It causes a superficial micosis which incidence can be about 32% in the tropical latitude. The presence of dicarboxilic acid avoids the skin to get its normal tune, so it causes less-pigmented lesions in the patients sking. It needs the presence of the corneal surface of the sking and its keratine to grow, in which it becomes a saprophite.
**Case report:** We report the case of a 27 year old pregnant woman with a Tinea versicolor in all his back, who benefited from a labour epidural analgesia, realised with normal antiseptic measures. The entire lumbar region had the presence of scaly, pruritic lesions, which suggested Tinea versicolor. During the previous anamnesis, the patient mentioned that these lesions were chronic, that had gone worse during his pregnancy, and that some members in her family were also affected. Tinea versicolor was the suspected diagnosis, so after the dermatologist exploration and the sampling for microscope analysis of some of the lesions it was confirmed. The patient was applied epidural following the usual protocol. No incidences during the procedures appeared. One month later, no neurological or infectious complication occurred.
**Discussion:** Malasezzia furfur behaves as a skin saprophyte that needs the corneal stratus to grow and be pathogen. For that reason, although classically the local infection has been reported as a formal contraindication for this procedure, we consider that this technique in Tinea versicolor is a safe procedure. This case can be considered as a representative case.
**References:**
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- Dubar G, Omarjee M, Viguié C, Barbarot S, Mignon A. Ann Fr Anesth Reanim. 2011 Jul-Aug;30(7-8):597-9. doi: 10.1016/j.annfar.2011.04.014. Epub 2011 Jun 15. French.
- Clark A, Camann W, Mavropoulos A. Int J Obstet Anesth. 2013 Jul;22(3):265-6. doi: 10.1016/j.ijoa.2013.03.014. Epub 2013 May 24.
**Learning points:** Epidural analgesia should not be contraindicated in this skin infection due to the nature of its etiology. The confirmation of this infection is essential before the procedure. Once it is confirmed, no special protocols shoud be applied comparing with the rest of the spinal analgesia.

## 03AP11-2

### Spinal anaesthesia in patient with Merosin-deficient Congenital Muscular Dystrophy type 1A (MCD1A)

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**Background:** MCD1A is a multisystemic disorder characterized by progressive muscle weakness and degeneration. Clinical manifestations are heterogeneous ranging from severe to mild.
It is an autosomal recessive genetic disorder caused by a mutation in the laminin alfa2 gene (LAMA2). In Europe it represents 30-40% of all congenital muscular dystrophies. The main anaesthetic concerns are related to difficult airway, respiratory and cardiovascular dysfunction and the use of muscular relaxants. There are no reports of regional anaesthesia in MCD1A patients.
**Case report:** 32 years old male patient, diagnosed with MCD1A, ASA physical status III, admitted for urgent right transtrocanteric femur fracture repair. Clinical manifestations: slight mental retardation, myopathy, neuropathy and cardiac involvement with slight compromise of systolic function. No respiratory involvement or other comorbidities. Physical examination: proximal tetraparesia (grade 4/5 superior limbs, grade 3/5 lower limbs), scapular winging, lumbar hyperlordosis, osteotendinous reflexes diminished and symmetrical peripheral neuropathy in a stocking glove distribution
Informed consent was obtained for spinal anaesthesia, which was performed using a Quincke type spinal needle (25G) at the first attempt with administration of 10mg of Levobupivacaine (5mg/ml) and 0.002 mg of Sufentanil (0,005mg/ml). The surgical procedure lasted 105 minutes with stable hemodynamics. The patient was admitted in the Post Anaesthetic Care Unit (PACU) where he stayed for 2 hours. At the time of discharge sensory and motor function returned to previous status. Muscular and sensitive disability was re-evaluated 24h after the blockade. No motor and sensitive changes were found. The patient was discharged 1 day later. No complications were reported during hospital stay.
**Discussion:** Spinal anaesthesia was used with success without any change in the neurological status and avoiding the need of general anaesthesia and its inherent concerns in this disease. This is the first report of neuro-axial regional anaesthesia performed in MCD1A patients.
**Reference:**
LAMA2-Related Muscular Dystrophy; Quijano-Roy S. Sparks S., Rutkowski A; GeneReviews; June 2012.
**Learning points:** Spinal anaesthesia was performed safely, although more cases are needed in order to consider regional anaesthesia an option in patients with this disease.

## 03AP11-4

### The suprasacral parallel shift (SSPS): an attractive alternative to subarachnoid anaesthesia in the very elderly patient with proximal femur fracture

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**Background:** Subarachnoid anaesthesia in very elderly high-risk patients may be not feasible. The SSPS is an ultrasound(US)-guided technique proposed by Bendtsen[1] to block of the lumbosacral nerves that innervates the hip and the proximal femur.
**Case Series:** Between October and December 2015, 15 consecutive ASA 3 patients (11 female, median age 89 years) underwent SSPS before surgery for femur fracture (4 partial hip replacements, 8 proximal femur nails, 3 open reductions) at the University Hospital of Padua. Patients' comorbidities included severe aortic stenosis and severe dilated cardiomyopathy. Using a convex US probe (Sonosite), we introduced a nerve block needle (22G-100mm, Sonoplex, Pajunk) in the space between the sacrum and the transverse process of L5 with a steep out-of-plane approach. Bones were always clear at US, while the lumbosacral ligament was not always visible. Ligament crossing was associated with a clear pop sensation and low resistance to injection. Correct needle positioning was confirmed by electric nerve stimulation with quadriceps contraction evoked in 70% of the patients. As soon as 10 min after injection of 20-25 ml ropivacaine 0.5%[2] we assessed an important NRS and pain behavior reduction in all patients. As dementia was frequent in our patients, the precise sensory-motor block definition was rarely possible. In 13

patients we obtained an anaesthetic block and we reduced operative discomfort in 5 of them with light propofol sedation. In 1 patient, we placed an i-gel LMA for deeper sedation, while in another case we added a femur nerve block because the lumbosacral block was just analgesic. All the 15 patients were pain free after surgery.
**Discussion:** SSPS is an US-based block[2], but ENS may help especially in patients with poor US images. The main implementation of SSPS was on healthy volunteers[1] and we fused it in very old patients, as it is safer than subarachnoid anaesthesia with better haemodynamic stability and fewer contraindications. SSPS may be even preferred to other nerve blocks (psoas, 3-in-1) as it needs less volume and only a single puncture to block the whole surgical territory.
**References:**
1. Bendtsen TF et al. The suprasacral parallel shift vs. lumbar plexus blockade with ultrasound guidance in healthy volunteers -a randomised controlled trial.Anaesthesia 2014,69,1227-1240.
2. Bendtsen TF et al. Ultrasound guided single injection lumbosacral plexus blockade for hip surgery anaesthesia.http://bja.oxfordjournals.org.

## 03AP11-5

### Awake thorascopy procedure with pecs block: a case report

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**Background:** Performing awake video assisted thoracic surgery is a challenge for the anesthesiologist. Several techniques have been described from local wound infiltration to epidural anesthesia. Recently a new technique has become available to perform analgesia/anaesthesia during thoracic wall procedures: the PECS Block.
The PECS Block was originally described for breast surgery[1]; poor literature exists about the use of PECS Block in thoracic surgery[2].
**Case report:** The patient was 75 years old man, with history of arterial hypertension and acustic neurinoma. He was scheduled for awake VATS for recurrent pleural effusion. After sedation (remifentanyl infusion at 0,025 γ/kg/min) we perform the PECS blocks, ultrasound guided in three steps: PECS I (10 ml of Ropivacaine 0.375% between pectoralis major and minor at the 3rd rib level); PECS II (20 ml of Ropivacaine 0.375% between pectoralis minor and serratus anterior at the 4rd rib level); Serratus Plane Block (30 ml of Ropivacaine 0.25% between serratus anterior and latissimus dorsi at the 5 rib level). The thorascopic procedure was perform through the insertion of two 7.5 FR Trocars at the 4™ intercostal space and consisted in drainage of about 800 ml of pleural liquid and different biopsies at the parietal, visceral pleura and lung. The duration of procedure was 90 minutes. Vital signs were stable during the operation.The median NRS during the procedure and at 24 hours was 2 without need for analgesic rescue.
**Discussion:** This case report (never described in literature before) proved our aim:
The efficacy of PECS Block technique to provide anaesthesia during an awake VATS procedure.
We demonstrate that PECS Block could be a very useful technique to provide anaesthesia during VATS procedure, with the advantage of being less invasive than epidural and paravertebral blocks. More studies are necessary to evaluate the efficacy and safety of this approach.
**References:**
1 Blanco R. The ‚Pecs block': a novel technique for providing analgesia after breast surgery. Anaesthesia 2011; 66: 847-8.
2 Blanco R. Serratus plane block: a novel ultrasound-guided thoracic wall nerve block. Anaesthesia. 2013 Nov;68(11):1107-13.
**Learnings points:** The future central role of PECS block in thoracic surgery: anaesthesia for awake thorascopy and analgesia alone or to complete the distribution of other techniques, epidural/paravertebral blocks.

## 03AP11-6

### Assesment of patients comfort after undergoing anterior cruciate ligament surgery with arthroscopy under general anesthesia and ambulatory surgery regimen after a saphenous nerve block with oral analgesics at home

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**Background and Goal of Study:** The surgery of the anterior cruciate ligament is a minimally invasive technique performed by arthroscopic technique. However this surgery couses severe/moderate pain due to several factors, such us tourniquet, the position of the knee and the surgery itself. In many hospitals it is still performed us an inpatient sugery stay due to poor pain control.
The aim of this study is to assess the degree of comfort of patients undergoing anterior cruciate ligament surgery with arthroscopy under general anesthesia and ambulatory surgery regimen after a saphenous nerve block and with analgesics by mouth at home.
**Materials and methods:** A prospective study of 14 patients undergoing anterior cruciate ligament surgery with arthroscopy. A saphenous nerve block guided by ultrasound is performed providing 20ml of Levobupivacaine0.5% before surgery. During the inmediate postoperative period NSAIDs were administered in all patients intravenously.
Acetaminophen 1g/8h+Dexketoprofen 50mg/8h were prescribed us out-of-hospital treatment and tramadol 100g/8h just as rescue treatment.
Intraoperative opioid requirements, the VAS at the exit of surgery, at postoperative 2h,4h,24h and 48h, need for rescue analgesia and overall patient comfort were assessed.
The level of overall comfort of patients was evaluated by a numerical scale from 1 to 4 where 1 mean the maximum comfort and 4 the minimum.
**Results and discussion:** The following table shows the results obtained between demographics parameters, ischemia time as well as VAS and degree of patient comfort.

| | Average | SD | Median | p25 | p75 |
|---|---|---|---|---|---|
| Weight (kg) | 78.6 | 8.9 | 79 | 75 | 84 |
| Height (cm) | 178.7 | 10.1 | 182.1 | 172.2 | 185.8 |
| Ischemia time (minutes) | 79.3 | 19.5 | 80 | 75 | 90 |
| Inmediate PO VAS | 4.4 | 2.7 | 5 | 3 | 6.8 |
| 2h PO VAS | 3.3 | 1.6 | 3 | 2 | 4 |
| 4h PO VAS | 2.9 | 1.7 | 3 | 2 | 3 |
| 24h PO VAS | 4.4 | 1.9 | 4.5 | 3 | 5.8 |
| 48h PO VAS | 3.7 | 1.7 | 4 | 2.2 | 4.8 |
| Patient Comfort | 1.9 | 0.8 | 2 | 1.2 | 2 |

*[Table 1]*

No side effects were found.
**Conclusion:** Patients undergoing anterior cruciate ligament surgery with arthroscopy under general anesthesia, with a saphenous nerve block and an oral analgesics(NSAIDs+acetaminophen) therapy have a postoperative mild/moderate pain with a high degree of satisfaction and comfort.
At the end of the study all patients said that if they would repeat the surgery they would do with the same protocol.

## 03AP11-7

### Eficacy and safety of bilateral sequential antebrachial intravenous regional anaesthesia with low dose lidocaine for the treatment of palmar hiperhidrosis with botulinum toxin

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**Background and Goal of Study:** Palmar hyperhidrosis is a pathology that impedes patient's daily life, theirs interpersonal relations and work. Injection of botulinum toxin in the palms significantly reduces the perspiration for months. The procedure is very painful due to the sensibility of the zone. We used a

bilateral sequential intravenous regional anaesthesia with low dose lidocaine and with antebrachial ischemia with the aim to evaluate the efficiency and safety of the technique.
**Material and methods:** 55 bilateral procedures were included. We cannulated a vein in at the dorsum of each hand, ischemia was accomplished with a simple cuff 3-4 cm proximal to the wrist (250-300mm Hg) and we administrated a total dose of 15ml (women) to 20ml (men) of 0,5% lidocaine per hand was administered. Cuff was deflated after 20 minutes and then we proceeded with the other hand.
**Results:** The average of pain with the infiltration of toxin was of 2,12 +/-1,97 according to a VAS scale. We did 110 procedures. In 8 (7,25 %) occasions it was necessary to reinforce the dose of lidocaine administered. Once administered the reinforcement, only 2 patients needed sedation because of inadequate analgesia. The average of pain related to pressure of the cuff was 2,04 +/-2,16 and pain associated to injection of lidocaine of 3,24 +/-2,09. Complications: 2 patients referred tinnitus of and one case of dizziness. No intervention needed as they resolved spontaneously in less than two minutes.
**Conclusion(s):** Bilateral sequential intravenous regional anaesthesia with low dose lidocaine and with single cuff antebrachial ischemia is effective and safe for the treatment of palmar hyperhidrosis with botulinum toxin.

## 03AP11-8

### Single puncture ultrasound guided “glove” block: an observational study

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**Background and Goal of Study:** Innervation pattern of the hand is complex. Therefore, regional anaesthesia performed for hand operations requires multiple-puncture or combination of regional and local anaesthesia[1].
The aim of the study was to investigate the feasibility and effectiveness of an ultrasound-guided single-puncture block, performed at the forearm, for hand surgery.
**Materials and methods:** After Ethics Committee approval, 45 patients ASA I-III, undergoing minor hand operations were enrolled in this prospective observational study. Short-axis ultrasound imaging of the median nerve, anterior branch of the radial nerve and the ulnar nerve was performed at the anterior part of the distal third of the forearm. A 50 mm needle inserted in plane, in the medial part of the former territory, allowed the infiltration of these three nerves, as well as the branches of the musculocutaneous nerve (MCN) and the medial antebrachial cutaneous nerve, both lying on the antebrachial fascia. A total volume of 20 mL of lidocaïne 1,5%/epinephrine 1:400.000 was injected. Quality of sensory block (pinprick and cold tests) before incision, incision time, VAS score at incision time and overall patient satisfaction (0-10) were recorded. Data are presented as means +/- standard error of the mean and percentages.
**Results and discussion:** Sensory “glove block” allowed surgery for 97% of the patients. Incision was possible after 5.70±0.15 min in 82% of the cases (37/45 patients), but only after 17.86±1 min for 7 patients (15%), due to MCN block delay. VAS at incision was 0,8±0,3. Only one patient needed general anaesthesia as rescue. Overall satisfaction of the patients was 8.88±0.20.
**Conclusion(s):** Ultrasound-guided single puncture “glove-block” is a simple and effective anaesthesia technique for minor hand operations. This procedure is appreciated by patients and adequate for day-care surgery.
**Reference:**
1. Delaunay L., Chelly J.E. Blocks at the wrist provide effective anesthesia for carpal tunnel release. Can J Anaesth. 2001;48(7):656-660.

## 03AP11-9

### Serratus plane block. Above or beneath the serratus muscle? Initial evaluation of efficacy and safety

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**Background:** Recently, Blanco et al have described a novel regional approach to block anterior and lateral cutaneous branches of the intercostal nerves in the mid- axillary line both superficial and underneath the Serratus muscle, with increased duration and dermatomal distribution of the superficial block[1]. On the contrary, Fajardo and colleagues favored the deeper block between the serratus and external intercostal muscle[2].
**Objectives:** Initial evaluation of efficacy and safety of the serratus anterior plane (SAP) block, both superficial and deep to the serratus muscle in patients undergoing breast surgery.
**Materials and methods:** Medical records of 20 patients who underwent breast surgery and received SAP block under ultrasound guidance, either above or beneath the serratus anterior muscle with 30 ml of 0.375% Ropivacaine in a period of last 3 months were reviewed. Clinical efficacy and safety was assessed by the use of intraoperative opioids and complication if any, in anaesthesia chart and by assessing the numerical rating pain scores and the need for rescue analgesia in postoperative notes.
**Results and discussion:** A total 20 patients had received SAP block out of which 13 received it above the serratus anterior muscle and 7 beneath it. Intraoperative opioids was required in 3 out of 13 patients in superficial SAP and 1 out of 7 in deep SAP block. post operative pain scores were similar in both groups and most of the scores were below 4/10 and was well managed with intravenous Paracetamol and Diclofenac. 1 patient who received a deep SAP block had a pain score of 5 or more in a follow-up period of 24 hours and received intravenous tramadol. None of the patients had any complications, but 1 patient had technical difficulty in deep block due to excessive axillary fat.
**Conclusion:** SAP block is a simple regional technique, which provides good opioid sparing analgesia in a multimodal pain management program. There was not much difference in superficial or deep approach to SAP in regards to pain scores.
**References:**
1. Blanco R, Parras T, McDonnell JG, Prats-Galino, A. (2013), Serratus plane block: a novel ultrasound-guided thoracic wall nerve block. *Anaesthesia.2013,68:1107-13.*
2. Diéguez P, Fajardo M, López S, Alfaro P, Pensado A. Ultrasound-assisted approach to blocking the intercostal nerves in the mid-axillary line for non-reconstructive breast and axilla surgery. *Revista Espanola de Anestesiologia Reanimacion* 2013.04.002.

## 03AP11-10

### Ultrasound-guided infraclavicular brachial plexus experiments; retrospective assesment

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**Background and Goal of Study:** In this study the outcomes of 60 ultrason-guided infraclavicular blocks were evaluated , block success, complications, procedure duration were reviewed.
**Materials and methods:** 60 patients with ASA I-III, over 18 years of age to whom forearm and hand surgery would be performed were included in this study after approval of the ethical committee. Demographic data was recorded, heart rate, non-invasive blood pressure and peripheral oxygen saturation were monitored. 2 mg midasolam was administered intravenously half an hour before the operation for premedication. Pain felt by the patient throughout the procedure was recorded by examination with the pain scoring. Onset time of the blockade, procedure duration, duration of sensory blockade, need for additional analgesic and the general anesthesia were recorded. The time of first postoperative pain felt by patient, first use of analgesic and time to disappearance of motor block were recorded**.**
**Results and discussion:** The duration of surgical procedure which ranges from 15 to 185 averaged 60,17±24,49minutes, duration of blockade procedure which ranges from 2 to 20 minutes averaged 7,74±4,67minutes. Onset time of blockade which ranges from 4.5 to 20 minutes averaged 11,97 ± 2,85,

the duration of disappearance of motor blockade which ranges from 120 to 1080 minutes averaged 437,20±238,34 minutes, the duration of sensory blockade which ranges from 37 to 720 minutes averaged 439,94±153,22 minutes, the time of spontaneous pain felt by patient which ranges from 150 to 1380 averaged 585,00±216,88.
While the first hour NRS Pain scores of phenomenons range from 1 to 4 averaged 1,68±0,87, sixth hour scores range from 1 to 5 averaged 1,70±0,96 and while fifth minute Holmen scale outcomes which range from 0 to 3 averaged 1,05±0,47, at fifteenth minute it was determined that these scores which range from 1 to 3 averaged 1,71±0,74.
While the fifth minute rates of quality of motor blockade which range from 0 to 3 averaged 1,07±0,48, at fifteenth minute these rates which range from 1 to 3 averaged 1,73±0,74. At the same time while fifth minute Wilson sedation scale rates which range from 0 to 3 averaged 1,08±0,43, at fifteenth minute these rates rangin from 1 to 4 averaged 1,44±0,68. None of the patients developed any complications.
**Conclusion:** High block success rate and remarkably low complication rate were noted in ultrasound-guided infraclavicular brachial plexus block.

## 03AP11-11

### Awake transcatheter aortic valve implantation (TAVI) with ultrasound-guided nerve block: a case series

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**Background and Goal of Study:** For severe aortic stenosis(AS) patients with advanced age and comorbidities, transcatheter aortic valve implantation (TAVI) is an safe and well-established alternatives. Compared to general anesthesia, TAVI under sedation provides shorter procedure time, less hemodynamic instability and quicker postoperative recovery.
However, desaturation and hypercapnia can also developed under sedation. Awake TAVI can avoid the complications related to general anesthesia and sedation.
Here we proposed our experience in awake TAVI procedure using ultrasound-guided regional nerve block (UGNB).
**Materials and methods:** Over a 3 months period, we performed awake TAVI procedure with UGNB on six patients (4 males, 2 females, mean age 80.8 +/- 8) with severe AS (Aortic valve area 0.66 +/- 0.12 cm2).
All patients were ASA class IV. Standard monitor with radial artery and internal jugular vein cannulation were applied. Ilioinguinal nerve and femoral branch of genitofemoral nerve were blocked with 50mg of 2.5% of levobupivacaine under direct ultrasound visualization. Sensory blockade was confirmed before vascular puncture.
All patients underwent CoreValve (Medtronic, CV Luxembourg S.a.r.l.) prosthetic implantation. Intraoperative hemodynamic parameters and visual analogue pain score were recorded. The patients were sent to ICU for postoperative care.
**Results and discussion:** All patients were awake and tolerated well throughout the procedure. The pain score was less than 3 in all of the patients. No desaturation, aspiration, and local anesthetic systemic toxicity occurred. Mean procedure time was 153 +/- 50 minutes. Mean ICU stay was 1.5 +/- 0.8 days. None of these patients had post-procedural neurologic complications.
General anesthesia, sedation, and regional anesthesia all have been performed for TAVI. Minimal physiological disturbance and fast recovery are especially valuable for this fragile patient group. Awake TAVI avoids the possible physiologic disturbance of sedation towards respiratory and cardiovascular system. Ilioinguinal nerve and genitofemoral nerve block provides sensory blockade of inguinal and femoral area. With ultrasound guidance, maximal analgesia could be achieved with minimal local anesthetics and complications.
**Conclusion(s):** TAVI with UGNB is feasible and safe. Crosstalk between cardiologist, regional and cardiac anesthesiologist is important for optimizing perioperative care in TAVI patients.

# Obstetric Anaesthesiology

## 04AP01-1

### A reduction in preoperative FIBTEM A10 measured by ROTEM® predicts postpartum hemorrhage >2 L for women undergoing caesarean section

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**Background and Goal of Study:** Excessive postpartum hemorrhage (PPH) is a major cause of maternal mortality. Approximately 1% of maternal hemorrhage exceeds 2 L. The incidence of disseminated intravascular coagulation with a total hemorrhage volume of >2L and 3L is 7.3% and 23.2%, respectively. Charbit and colleagues reported that a fibrinogen concentration <2 g/L predicts PPH in 100% of cases.[2] In our institution, more than 30 min is generally required to obtain the results of this investigation. Rotation thromboelastometry (ROTEM®) can assay hemostasis parameters within 15 min. We hypothesized that preoperative ROTEM® can predict the amount of bleeding during caesarean section (C-section).
**Material and methods:** We enrolled 26 women scheduled for C-section. ROTEM® tests (EXTEM and FIBTEM) were performed on entering the operating room. Participants were divided into two groups according to the total perioperative bleeding volume: >2 L (High group) and ≤2 L (Low group). Statistical analysis was performed using Student's t-test and logistic regression analysis (SPSS version 22).
**Result:** There were seven patients in the High group and 19 in the Low group. FIBTEM A10-A20 of the High group was significantly less than the Low group indicated at the table ($p < 0.05$). In logistic regression analysis, only FIBTEM A10 showed significant differences in for both the whole model test and parameter estimates ($p = 0.020, 0.049$). Based on the receiver operating characteristic curve, the cut-off value for hemorrhage >2 L was 14 mm, and the odds ratio was 1.420 (95% confidence interval 1.005-2.183).
**Conclusion:** FIBTEM A10 measured by ROTEM® on entering the operating room can predict intraoperative hemorrhage >2 L. The risk rises 1.4-fold for every 1 mm of reduction in FIBTEM A10.
1. Japanese Journal of postpartum and neonate 2008; 44: 992
2. Charbit B, Mandelbrot L, Samain E, et al.; PPH Study Group. The decrease of fibrinogen is an early predictor of the severity of postpartum hemorrhage. J Thromb Haemost. 2007;5:266-73.

## 04AP01-2

### Use of intraoperative cell salvage (ICS) in obstetrics: experience from two large UK district general hospital maternity units

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**Background and Goal of Study:** The use of ICS in maternity is approved by NICE(UK)(1). This audit was conducted in two large UK centres to assess safety, feasibility and practicability of ICS in caesarean section(CS). We also aimed to analyse whether the rate of allogenic blood transfusion was reduced with ICS and if it is cost-effective to salvage blood at all CS.
**Materials and methods:** We retrospectively audited all women delivered by CS over a five year period from February 2010 until January 2015. ICS was set up for women thought be at higher risk of bleeding. Data was collected from an electronic obstetric anaesthesia database. Excel spread sheet was used to input following data:risk factors, CS category, estimated blood loss, amount of processed blood transfused, ICS not used due to lack of trained staff, allogenic transfusion, haemoglobin levels. To prevent contamination,a separate suction device was used after rupture of membranes until delivery of the baby and placenta. Processed blood was always transfused. Haemoglobin level of 8g/dL was used as a trigger for allogenic transfusion after using all available salvaged blood.

**Results and discussion:** Data was analysed for 9367 CS out of which 1124 (12%) received ICS.88 (0.93%) didn't receive ICS due to lack of trained staff though falling under higher risk group. Rate of allogenic transfusion in no ICS group was 8.9% (734) including 46 from no ICS due to lack of training. 675 (60%) from ICS group had adequate processed blood for reinfusion.Only 13 (1.1%) from ICS group needed allogenic blood transfusion.Mean volume processed was 2276 mL (max 4693 mL). An average of 303 mL (max 617 mL) of salvaged blood was transfused. No adverse events were seen due to cell salvage. The economic benefit was reflected by the low cost of salvaged blood (£82.64 per equivalent unit) compared to allogenic blood (£140 per unit).
**Conclusion(s):** In our audit,use of cell salvage significantly reduced the need for allogenic blood transfusion in parturients thought to be at higher risk of bleeding. However the limitations are predicting actual significant obstetric haemorrhage based on risk factors. Adequate provision should be made for trained staff available to set up ICS for CS. Further studies are required to assess whether ICS should be offered to all planned and most emergency CS.
**Reference:**
1. National Institute of Clinical Excellence.Intraoperative Blood cell salvage in obstetrics.November 2005:No 144

## 04AP01-3

### Anaesthetic management of a pregnant patient with von Willebrand's disease

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**Background:** Being the most frequent inherited bleeding disorder (1-2% prevalence in the general population[1], von Willebrand's disease (vWD) is likely to be encountered clinically by anaesthesiologists. It is characterized by either quantitative or qualitative abnormalities in von Willebrand Factor (vWF) and encompasses 3 types[2], the most common of which is type 1, where there is essentially a quantitative deficit of vWF.
**Case report:** 29-year-old, ASA 2 patient presenting in labour with known type 1 vWD, diagnosed at the age of 13 (study of menorrhagia), with no treatment. There was no clinical history of either spontaneous or provoked mucocutaneous bleeding during pregnancy.
The patient had been followed closely as an outpatient by Haematology, with dosing of vWF showing supranormal levels in the third trimester, no changes in clotting times nor in platelet levels. Haematology considered there to be no contraindication for neuroaxial techniques nor indication for desmopresin use. A combined spinal epidural was performed, with the patient eventually proceeding to caesarean section for non-progression of labour, with anaesthesia provided via the previously placed epidural catheter. There were no excessive blood losses either intra- or postoperatively. The epidural catheter was removed 24h after surgery, and the patient discharged nome uneventfully on the 3rd postoperative day. Close neurologic monitoring evidenced no changes.
**Discussion:** During late pregnancy the levels of several clotting factors tend to increase as a preparation for labour, namely fibrinogen, FVII, FVIII, FX and vWF[3]. In type 1 vWD, where there is a lower level of normally functioning vWF, this means that the disease can actually normalize towards the peripartum period, with temporary correction of the increased bleeding tendency. Appropriate haematological follow-up is instrumental, and in our case it allowed a timely characterisation of our patient's profile, revealing that neuroaxial techniques were not contraindicated by the disease.
**Learning points:** While bleeding risk may constitute a contraindication for neuroaxial techniques, in the particular case of type 1 vWD blood levels of clotting factors may become transiently normal during late pregnancy. Naturally, it is fundamental to make sure these patients are appropriately followed by a specialist to timely assess available therapeutic options.

## 04AP01-4

### Prophylactic administration of tranexamic acid reduces blood loss and post operative inflammation after caesarian section. A prospective randomised double blind versus placebo study

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**Background and Goal of Study:** A variety of drugs have been used to prevent as well as to treat postpartum haemorrhage (PPH). The "EXADELI" study; conducted in 2011, was the first to show that a high dose of tranexamic acid (4gr over one hour) can reduce blood loss and maternal morbidity in women with PPH.In the same perspective; the "WOMEN" study; which is still conducting, trying to objectify the impact of systematic administration of tranexamic acid in diagnosed PPH. Initial results seem promising. And her comes a question: why not administer tranexamic acid to prevent PPH with a reduced dose (1g).
**Materials and methods:** We conducted a prospective, randomized, monocentric, double-blind versus placebo study; Which took place during the period between 12/2014 and 03/2015 in the obstetric unit of the military hospital of Tunisia we included all pregnant women programmed for caesarian delivery over the age of 20 and ASA I or II.
We excluded non consentant women and those with history of recent anticoagulation or antiaggregation. Included patients were randomized by a computer software (www.random.org) and then divided in two groups:
Group A: including those receiving tranexamic acid (EXACYL®) intravenously 1 gr over 30 minutes starting from the IV cannula positioning, and
Group B was the control group.
Statistical analysis was carried out by SPSS software 20.0®.
**Results and discussion:** The two groups were comparable the demographic parameters, type of anesthesia (general or spinal anesthesia), preoperative biology and known risk factors of PPH and operator's Level of experience.
Hemoglobin levels in group A were higher at H2 (p=0.02), and H6 (p=0.036).
Platelets count was higher in group A at H2 (p=0.03) and H24 (p=0.01).
fibrinogen rates were higher in group A at H6 (p=0.01) and H24 (p=0.04).
no differences between groups were noted in term of hematocrit, thromboplastin time Thrombin Time and postoperative complications.
C-reactive protein in group B were higher at H6 (p=0.04) and H24 (p=0.02).
**Conclusion(s):** Tranexamic acid appears to have a beneficial effect on perioperative bleeding and its biological impact during Caesarean sections which could reduce the incidence and severity of PPH.
Wider scale studies are needed to confirm these results.
**Reference:**
High-dose tranexamic acid reduces blood loss in PPH. Ducloy-Bouthors AS; Crit Care. 2011; 15(2): R117.

## 04AP01-5

### Effect of total volume replenishment of massive obstetric blood loss on the frequency and severity of multiple organ dysfunction syndrome

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**Background and Goal of Study:** The Aim to evaluate the effect of total replenishment of massive obstetric blood loss in the frequency and severity of clinical manifestations of MODS.
**Materials and methods:** Having agreed with the local Ethics Committee and obtained the informed consents, 68 women (whose delivery or early postpartum period was complicated by acute severe hemorrhage with blood volume (BV) deficit of 40-52%) were examined. Patients were randomized into 2 groups depending on the characteristics of the BV replenishment. Both groups were similar in relation to age, gestation term, blood loss volume (2535±504 ml). In 1 group (n=30) BV replenishment performed according to Ukrainian national protocol (relation between erythrocytes, FFP, and platelet (if necessary) is 1:1:1). In 2 group (n=38) 1500 IU of Prothrombin Complex Concentrate (PCC, Octaplex) was added to therapy. Were assessed: the number of red blood cells, hemoglobin, hematocrit, standard coagulation, $SaO_2$, liver-kidney complex. Clinical signs of MODS are accounted for myocardial insufficiency - frequency and duration of vasopressor support; respiratory dysfunction - frequency and duration of mechanical ventilation; acute kidney

injury (AKI) - frequency and duration of renal replacement therapy (RRT), gastrointestinal (GIT) dysfunction - frequency and duration of the enteroparesis. The timepoints: 1, 3, 5, 7, 10, 14 and 28 days after delivery.
**Results and discussion:** Analysis showed that use of PCC reduced total infusion-transfusion volume by 24.5% (1300 ml). Comparative analysis of the frequency and severity of clinical manifestations of MODS is presented in Table 1.

| MODS signs | 1 group (n=30) | 2 group (n=38) |
|---|---|---|
| Myocardial insufficiency, number (%) / duration of vasopressor support, days | 11 (36.7%) / 3.3 | 4 (10.5%)/ 2.1 |
| Respiratory dysfunction, number (%) / duration of mechanical ventilation, days | 7 (23.3%) / 3.4 | 2 (5.3%) / 2.5 |
| AKI, number (%) / duration of renal replacement therapy, days | 21 (70%) / 4.3 | 14 (36.8%) / 2.8 |
| Gastrointestinal dysfunction, number (%) / duration of the enteroparesis, days | 15 (50%) / 5.1 | 9 (23.7%) / 2.9 |

*[Table 1]*

Patients 2 group had decreased frequency and duration of of vasopressor support, frequency and duration of mechanical ventilation, had reduced the number of patients requiring RRT, and it duration. The frequency GIT dysfunction reduced more than twice. This provided a significant reduction in the duration of stay in the ICU from 14.1±1.7 (1 group) to 7.8±2.1 days (2 group).
**Conclusion:** Reducing the total volume of infusion-transfusion therapy provides a significant decrease in frequency of clinical signs of MODS and reduces the duration of stay in the ICU.

## 04AP01-6

### Can early administration of fibrinogen improve post partum hemorrhage? A prospective observational study (preliminary results)

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**Background and Goal of Study:** Postpartum haemorrhage remains the first cause of maternal mortality worldwide specially when it leads to coagulopathy. Early tratment of coagulopathy with fibrinogen transfusion is obligatory. This trial aims to investigate if early treatment with fibrinogen concentrate reduces the blood loss and the need for blood transfusion.
**Materials and methods:** We included patients that needed 2g of fibrinogen transfusion in the treatment of severe postpartum hemorrhage due to uterine atony after cesarean section delivery. Fibrinogen was transfused to treat coagulopathy or after massive transfusion or earlier when practitioners in charge of the patient estimate that the bleeding may lead to coagulopathy. patients included were devided into 2 groups:
Group E (early): when fibrinogen was given within the first hour after sulprostone administration;
Group L : when fibrinogen was given after the first hour following the administration of sulprostone.
Then, we compared the blood loss estimated by Gross formula and the Red blood cell transfusion requirements in both groups.
**Results and discussion:** In this study, 9 patients were included (4 patients en group E and 5 patients in group L). Blood loss was correlated to the delay of fibrinogen administration. (Pearson correlation coefficient was 0.785) Blood loss was 2836 ml in group E versus 5855 ml in group L (p=0.042). Red blood cell transfusion requirements was 4.25 units/patient in group E versus 8.1 in group L (p =0.01).
**Conclusion:** Early administration of fibrinogen seems to reduce blood loss and transfusions after uterine atony in cesarean section delivery.

## 04AP01-7

### Using of prothrombin complex concentrate in obstetric massive bleeding

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**Background and Goal of Study:** In the developing world about 1.2% of deliveries are associated with postpartum hemorrhage (PPH) and when PPH occurred about 3% of women died.
**Materials and methods:** Our research involved 51 patients with massive postpartum bleeding after Cesarean section that were divided into 2 groups: 1st group contained 10 patients as a treatment of massive bleeding with coagulopathy was scheduled PCC in a dose of 1 ml/kg (25 IU/kg), packed red blood cells (PRBC), 2nd group (41 patients) received fresh frozen plasma (FFP) in a dose of 20 ml/kg and PRBC. The functional state of the hemostasis system was carried out using low-frequency pyezoelectric thromboelastography (LPTEG).
**Results and discussion:** According to LPTEG indicators patients with massive postpartum bleeding had abnormality in all parts of hemostatic system: platelet aggregation - Intensity of contact coagulation (ICC) was reduced by 45.64%, the coagulation - Intensity of coagulation drive (ICD) was less than normal at 59.32%, clot maximum density (MA) was reduced by 88.15% and fibrinolytic activity - Index of retraction and clot lysis (IRCL) was 86,16% above the norm. Indicators of platelet hemostasis in patients of 1st group characterized by hypoagregation: ICC was reduced by 18.69%, compared to the norm; parameters of coagulation and fibrinolysis have reliable trend toward normal and decreasing the activity of fibrinolysis index reaches normal reference values (ICD was less than normal at 10.65%, MA was reduced by 19.31%, IRCL was 15,21% above the norm, 2 hours after, and became to the normal 4 hours after infusion of PCC. Patients of 2nd group had hypoagregation and mild hypocoagulation state with increased active of fibrinolysis: ICC was reduced by 22.79%, ICD reduced by 20.79%, MA was reduced by 30.54%, IRCL was above the norm to 25.46% 4 hours after, and became to the normal 6 hours after infusion of FFP. Clinically patients of the 1st group had reducing signs blood loss, decreased volume of transfusion PRBC for 11% and decreasing volume of infusion therapy for 19% compared to patients of 2nd group. There was 1 case of transfusion related lung injury in 2nd group.
**Conclusion(s):** The use of prothrombin complex concentrate can reduce the level of blood loss decrease volume of transfusion packed red blood cells and infusion therapy. Reducing the use of blood components in the intensive care unit of massive bleeding can be a method of preventing the development of TRALI-syndrome.

## 04AP01-8

### Succesful management of placenta praevia combined with placenta percreta with scar hypervasculiarisation by multidisciplinary teamwork

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**Background:** Placenta percreta(PP) is a defect in placentation characterized by invade through myometrium to the serosa by the chorionic villi of the placenta. A major cause of morbidity and mortality in patients with placenta percreta is postpartum hemorrhage.1 Combination of placenta previa and PP is a rare and complicated condition which causes high morbidity and mortality. An even successfully managed cases require many blood components transfusions.
**Case report:** Gravida with a history of 2 previous cesarean sections(CS) was referred to ER at 23 week of gestation due to sudden onset of severe lower abdominal pain. Placenta previa was diagnosed and on images of US and MRI endorsed PP and hypervascularisation with large branch of a.iliaca int sin on scar zone. At 32 week of gestation CS under GA was scheduled. Subtotal hysterectomy without adnexes and both internal iliac artery balloon occlusion(IABO) was performed after alive male (Apgar 6/8) was delivered safely but with massive blood lost ( 4 L). Norepnephrine (0.1-0.2 μg/kg/min) maintained throughout surgery with obvious decrease in dose after inflation IABO.3 hours after deflation IABO in ICU haemorrhage was

observed,relaparotomy, left a.iliaca int ligation was performed. Blood loss 3 L. Following convalescence without complications. The total amount of 12L infusion was made to stabilise hemodynamics. Used 14 units(U) FFP, 16 units RBC, 12 U platelet, cryoprecipitate 20 U, 1,5g ac tranexamic.
**Discussion:** US and MRI are the most suitable to diagnose adherent placenta.After pros and cons on types of anaesthesia we preferred general anaesthesia just in case of massive haemorrhage appears so it is less complicated to stabilise hemodynamics.2One of the most successful treatment is hysterectomy and embolization of iliac arteries as to prevent the patient from massive haemorrhage.
**References:**
1. ACOG practice bulletin: number 76, Oct 2006: postpartum hemorrhage. Obs Gyn2006;108:1039-47.
2. Ch Sivasankar. Periop management of undiagnosed PP. Int J Womens Health. 2012; 4: 451-454.
**Learning points:** Perioperative management of a parturient in this case is challenging with the successfully managed massive intraoperative blood loss and disturbancies of coagulation. Aggressive management by a multidisciplinary team contributed to a successful outcome in presented case. Aa.iliaca interna embolization with balloon catheters is valuable method for blood loss control, but requires hemorrhage vigilance after deflation ballons.

## 04AP01-9

### Management of a parturient, with Ehlers-Danlos (hypermobility) syndrome and previous endoscopic thoracic sympathectomy, using a multidisciplinary approach

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**Background:** Ehler-Danlos Syndrome (EDS) is a rare genetically transmitted connective tissue disorder consisting of 11 subtypes. Type 3 (Benign familial hypermobility) is characterized by hypermobility and hyper elasticity of the skin, who are resistant to local anaesthetics. Patients who undergo T2-3 thoracic sympathectomy may have suppressed baroreceptor control of heart rate and are vulnerable to the depressed effects of anaesthetics. We report a management of a parturient having both of these conditions together, as no reports were found as per literature search.
**Case report:** A 36-year-old G1P0 healthy Caucasian woman presented at 32 weeks gestation in the anaesthetic antenatal clinic. Patient was diagnosed as an Ehler-Danlos syndrome type 3,with a history of resistance to local anaesthetic given for dental treatment. She also had history of hyperhidrosis for which she had endoscopic thoracic sympathectomy, when she was 18 years old.
She was seen in antenatal clinic and agreed for avoidance of regional techniques and having general anaesthesia (GA) for caesarean section (LSCS) and opioid base analgesia for labour like Entonox, Pethidine and Remifentanil PCA. Obstetricians were advised that if an episiotomy is needed general anaesthesia might be needed for suturing due to the resistance to local anaesthetics. At term, she presented for an elective LSCS due to breech presentation. She was given controlled balanced GA for LSCS with back up measures to control untoward effects of anaesthesia and previous sympathectomy.
**Discussion:** Avoidance of regional anaesthetic techniques and adherence to controlled GA technique, with back up measures to counteract the suppressed sympathetic effects on hemodynamics for LSCS, and opioid based techniques for labour analgesia could be prudent choices in patients with (ED) hypermobility type 3 syndrome with established autonomic imbalances.
**References:**
1. L.Arendt-Nielsen. Et al. 1990, insufficient effect of local analgesics in Ehlers Danlos type 3 patients (connective tissue disorder); Acta Anaesthesiol Scand, vol. 34;358-361.
2. Chao-Lun Lai. Et al. 2001 Bradycardia and Permanent Pacing after Bilateral Thoracoscopic T2-Sympathectomy for Primary Hyperhidrosis; PACE, Vol. 24(1),
524-25.
**Learning points:** A multidisciplinary team approach with anaesthetic antenatal plan is essential in safe management of patients with multiple problems.

## 04AP01-10

### Postpartum haemorrhage - the fibrinogen use

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**Background and Goal of Study:** The 2013 Guidelines of ESA implies fibrinogen levels of <2g/L identifies women who are at risk of severe postpartum haemorrhage (PPH).[1,2] Fibrinogen concentrate (FC) is available in our obstetrics unit since July 2014, which doesn't have its own blood bank. The aim of this study is to analyse the use of FC in severe PPH from November 2012 to November 2015.
**Materials and methods:** We conducted an observational retrospective study about the use of FC in severe PPH. Those given ≥4 packed red blood cells (RBC), within 4 hours, and/or FC were considered. Files were sourced for data on demographics; obstetrics; comorbidities; pre and post transfusion haemoglobin (Hb); fibrinogen levels; blood components (BC) transfused. Statistical analysis was performed using SPSS Statistics® 22. Descriptive and inferential (Mann-Whitney U, Kruskal-Wallis and Student's't tests) analysis procedures were performed at a significance level of 5%.
**Results and discussion:** During this period 0.3% (n=21) of 7419 deliveries met the criteria. The average age was 32.6±5.9 years and gestational stage 36.3±4.0 weeks. 90.5% (n=19) were ASA II and 60% (n=12) were multiparous. 80.9% (n=17) of deliveries were dystocic (10 c-sections), with 4 (19.0%) stillbirths. Preeclampsia was diagnosed in 28.6% (n=6) and HELLP in 14.3% (n=3). Pre and post transfusion Hb was 6.6±1.4 and 10.3±1.4. The lowest value of fibrinogen was 1.3±0.8g/L [78.6% (n=11) <2g/L] and 3.9±0.9g/L at discharge. 81.0% (n=17) received FC. On average 5.8±3.4 RBC, 0.6±0.9 platelets, 3.4±3.3 inactivated human plasma (IHP), 1.8±1.3g FC and 9.5% (n=2) prothrombin complex concentrate were administered. The RBC:IHP ratio was 1.7:1. The most frequent cause of bleeding was uterine atony with 38.1% (n=8). All women survived.
The use of FC hasn't proved different (p=0.508) from the time that was available in our unit. The relationship between the plasma fibrinogen level and its administration relatively to the BC administered didn't differ significantly (p>0.05). Charbit et al. published evidence of low fibrinogen levels in severe PPH.[2] Although most women had fibrinogen <2/L, there was no statistically significant difference with the BC transfused.
**Conclusion(s):** In our unit, the criteria for BC administration are guided by individualized assessment. Institutional protocols are being discussed to standardize severe PPH management.
**References:**
1 Eur.J.Anaesthesiol.2013;30(6):270-382
2 J.Thromb.Haemost.2007;5:266-73

## 04AP01-11

### Multidisciplinary approach in obstetric life threating emergency: placental abruption in a pregnant woman with an anterior placenta praevia

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**Background:** Placental abruption and placenta praevia are major causes of obstetric haemorrhage. The conjunction is rare and could lead to fatal haemorrhagic shock. Perioperative course of a patient in this involvement presented for emergent cesarian section is described.
**Case report:** 37 years old multigravida (4OO4), 33th gestation week was admitted on the emergency department in hypovolemic shock. Vaginal bleeding was abundant and fetal distress was recognized.
She had been in the hospital 10 hours before for sudden onset abdominal pain and marginal dark blood loss. Fetal wellbeing was confirmed and hospital discharge was requested.
Fluid resuscitation and emergent cesarean section were carried out.
On surgery theatre, her vital signs were HR 100/min and BP 90/43 mmHg. She was drowsy but arousable to verbal command and extremely pale. She was assigned an ASA 4(E). Massive transfusion protocol (MTP) was activated. Volume resuscitation with warm crystalloids was continued till the arrival of blood products.
In view of hypovolemia and emergent obstetric and fetal care, a general anesthetic technique was selected. Preoxygenation was performed and RSI was carried out with propofol and succinylcholine. On access to fetus important blood loss and episode of bradicardia (reversed with atropine) marked anterior placenta section. A live-born infant was delivered (APGAR: 4,7,8). Anesthesia was maintained with sevoflurane and rocuronium and supplemented with fentanyl, after fetal extraction. Hypothermia was prevented.
First laboratory evaluation showed a hemoglobin of 5,7 g/dL.Intraoperative blood loss was major but unpredictable. Two RCC ORh- was administered on the 20 minutes of surgery. Patient was transferred for ICU, ventilated. On course abundant vaginal hemorrhage was evident. Aggressive resuscitation care took place in this setting. A total of 4 RCC, 7 FFPs and 1 Platelet pool, 6g Fibrinogen and 2g was transfused. Recovery was uneventful.
**Discussion:** The crux of management of obstetric hemorrhagic shock is multidisciplinary care consisting of obstetrician, anesthesiologist, neonatologist, hematologist and IUC staff. Early activation of MTP is imperative. Disseminated intravascular coagulopathy can complicate bleeding. Efforts could be made to to avoid the vicious cycle of hypothermia, acidosis and coagulopathy in the massive transfusion patient.
**Learning points:** A multidisciplinary approach and planning catalyses the management in crisis situation.

## 04AP02-1

### Breakthrough pain in labour. A randomized double blind clinical trial comparing programed intermitent epidural boluses (PIEB) versus patient controlled epidural analgesia (PCEA) with epidural or combined spinal epidural technique: preliminary results

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**Background and Goal of Study:** The aim was to know the incidence of breakthrough pain (BP) comparing two analgesic regimes. We also evaluated the BP incidence between epidural (EA) and combined spinal epidural (CSE) analgesia.
**Materials and methods:** We performed a randomized double blind clinical trial on nulliparous women (18-40 yrs old), with a cervical dilatation <4cm at singleton term pregnancy. Exclusion criteria were contraindication for EA and the presence of systemic disease. Patients were randomized to receive EA with PCEA (group 1), EA plus PIEB (group 2), CSE with PCEA (group 3), or CSE plus PIEB (group 4). The anaesthesiologist who performed the epidural block was blinded for the analgesic regime, and pain was assessed by a third anaesthesiologist blinded for the technique or analgesic regime. All patients had a background epidural infusion (0.125% levo-bupivacaine with 1.45 mcg/ml fentanyl, 5 ml/h.). PCEA groups were set with 10 ml boluses (20 min lockout interval). PIEB groups received 10ml bolus per hour (20 min lock time with PCEA). BP was defined as the need for analgesia due to pain ≥4 in visual analog scale (VAS) and treated with 10ml bolus of epidural infusion. Failed block was considered when VAS was >3 sixty minutes after epidural catheter insertion and patients were excluded from the analysis. We recorded BP episodes, PCEA boluses, total volume of infusion, VAS pain scores, delivery outcomes, and maternal satisfaction.
**Results:** 60 patients were included. Groups were homogeneous. 93% of PIEB groups patients had 0 episodes of BP, and 95% of PCEA patients had at least 1 episode of BP (p=0,002). There was less BP episodes in PIEB groups (mean 0.5 ± 0.9 in group 2; 1.2 ± 1.8 in group 4) compared with control groups (2.4 ± 1.7 in group 1; 2.9 ± 1.7 in group 3) ($P$ <0.05). Total local anaesthetic in demand for BP was significantly lower in PIEB (mean 4.1 ± 7.2 ml in group 2; 95%; 9.4 ± 17.7 ml in group 4) compared with PCEA groups (28.8 ± 16.8 ml in group 1; 28.0 ± 16.0 ml in group 3) ($P$ <0.05). There were no difference between CSE versus EA groups regarding number of BP episodes and PCEA boluses ($P$ >0.05). VAS were lower in CSE compared with epidural groups at 30 min ($P$ <0.001), but they were comparable during labour. The incidence of failed block was 11.7%.
**Conclusion:** PIEB reduced the incidence of BP during labour compared to PCEA. CSE technique could not reduce the number of episodes of BP after the first 30 minutes.

## 04AP02-2

### Epidural catheter positioning in labour: Is the transverse echo-graphic approach accurate and precise for the definition of the epidural space?

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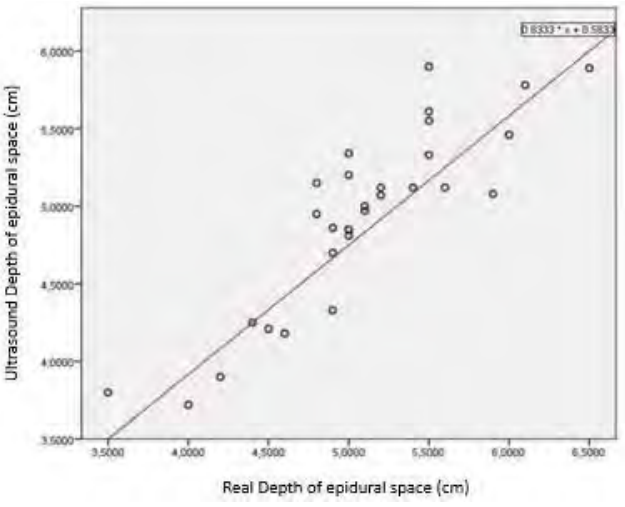
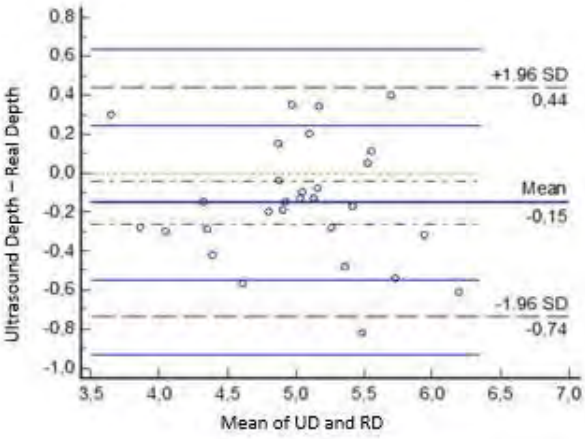
**Background and Goal of Study:** The loss of resistance (LOR) technique is the most used for the positioning of the epidural catheter in pregnant women but the anatomic landmarks are not always clear. [1]
The aim of our study was to verify the accuracy and precision of the transverse echo-graphic approach for the definition of the depth of the epidural space.
**Materials and methods:** Prospectic observational study conducted in the Hospital "S. Maria delle Croci" in Ravenna from February to June 2014. The epidural set used was B. Braun Perifix® Filter Soft Tip set. US imaging was performed using a portable SonoSite NanoMax® equipped with a 5-2 MHz C60n Convex probe.
The distance between the skin and the first hyperechoic line (posterior dura) was named "ultrasound depth", UD. Tuohy needle was then introduced with LOR technique and a mark was made at the skin level. The distance from the needle tip to the mark was as "real depth" (RD). Data regarding the whole procedure of epidural analgesia, RD, UD were collected.
**Results and discussion:** We examined 30 parturient women candidate for epidural analgesia, mean age 30.3 (±4.6), actual BMI 27.2 (±2.4). We found a correlation between RD and UD, with an index of Pearson correlation of 0.88, in line with the literature. [2-3] RD was 5.08 cm ± 0.62 cm while UD was 4.94 cm ± 0.60 cm.




*[Figure 1]*




*[Figure 2]*

At the Bland-Altman analysis, the mean difference between UD and RD was -0.15 cm (95% C.I. of 5.9 mm).

**Conclusion:** US-assisted epidural catheter positioning shows a great degree of correlation between UD and RD, but US measure tends to underestimate the RD of the epidural space. This discrepancy may be explained by the different needle trajectory, or the different tissue compression exerted by the probe.

**References:**

1. Borges B, et al. Reg Anesth Pain Med.2009;34:581-585.
2. Shaikh F, et al. BMJ. 2013;346:f1720.
3. Arzola C, et al. Anesth Analg. 2007;104:1188-92.

## 04AP02-4

### Respiratory rate and capnography are superior to pulse oximetry in detecting respiratory depression among laboring women receiving remifentanil

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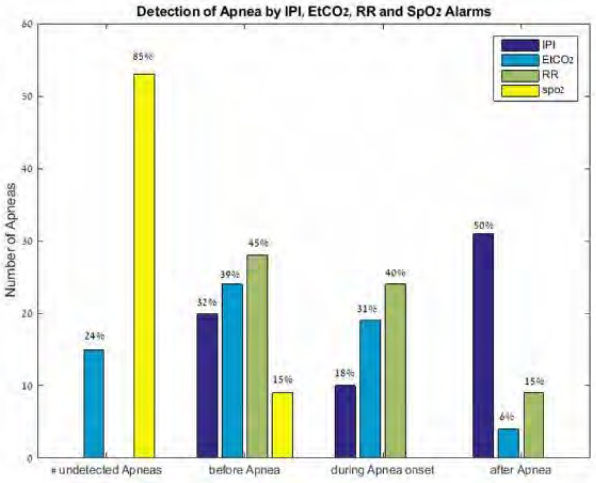
**Background:** Remifentanil may be used by labouring women for patient-controlled intravenous analgesia. Its use is controversial due to potential apnea leading to respiratory arrest. We evaluated the ability of several physiological variables to detect respiratory depression (RD) in laboring women receiving intravenous remifentanil.

**Methods:** A safety analysis of a prospective IRB-approved study of healthy women receiving intravenous patient-controlled boluses of remifentanil 20-60 mcg q1-2 mins for labor analgesia. The following physiological variables were monitored continuously: respiratory rate (RR), end-tidal $CO_2$ ($EtCO_2$), pulse oximetry ($SpO_2$), heart rate (HR), and the Integrated Pulmonary Index (IPI) (Capnostream©; Covidien, Boulder CO). The IPI value (1-10; 10 =healthy patient, =<4 =immediate attention required, 1 =dire condition), is generated from a logic algorithm using the RR, $EtCO_2$, $SpO_2$ and HR parameters. Alert triggers included: RR <8 breaths per minute (bpm), $EtCO_2$ <15 mmHg, and $SpO_2$ <92%. Apnea was defined as $EtCO_2$ <5 mmHg for at least 30 consecutive seconds.

**Results:** 10/19 (52.6%) of the women who received remifentanil (total dose 1725±1392 mcg, administered over 160±132 min) had at least one apneic episode. There were 331 cumulative individual physiological variable alerts; 82% of these alerts lasted => 10 seconds. In total, 62 apneas were counted; 100% were detected by RR <8 bpm and the IPI =<4 alert, 76% by $EtCO_2$ <15 mmHg, and 15% by $SpO_2$ <92%. There were 190 IPI alerts =<4; 84% of these alerts lasted =>10 seconds.

**Conclusion:** $SpO_2$, often viewed as the superior monitor for RD, exhibited the worst performance in detecting apnea. RR and IPI alerts (both derived from capnography) were more sensitive than $EtCO_2$ and $SpO_2$ to detect RD during intravenous remifentanil boluses for labor analgesia.




*[Alarm Histogram]*

Figure Alarm Histogram - relative time of alarms detection for individual variables to detect the onset of all apnea events: before, during and after apnea. Apnea onset = time zero; apnea defined as $EtCO_2$ <5 mmHg for at least 30 consecutive secs, from 40 secs prior apnea onset up to end of apnea event.

## 04AP02-5

### Hemodynamic changes assessed by ClearSight System during epidural labor analgesia

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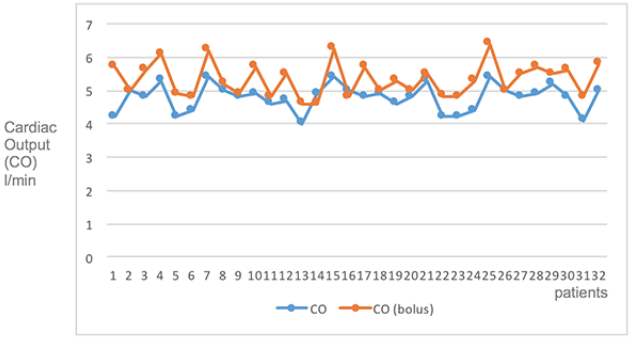
**Background and Goal of Study:** The ClearSight System is a noninvasive method that allow to obtain hemodynamic parameters without the placement of an arterial catheter enabling correct decision regarding fluid administration. The aim of this study was to determine the Cardiac Output (CO) and Stroke Volume (SV) after intravenous administration of a crystalloid bolus in patients undergoing epidural labor analgesia.

**Materials and methods:** A systematic multicentric review of our recorded data was analyzed on 32 parturients admitted for elective labor analgesia. Epidural analgesia was performed with levobupivacaine 0.0625% and fentanyl 50 mcg. Two measurements were made with the ClearSight System: 15 minutes after the execution of the epidural analgesia (these values were considered as baseline) and after intravenous administration of a crystalloid bolus (500 ml) over 30 min. Hemodynamic variables included heart rate, mean arterial pressure, CO and SV. Patients whose CO increased by more than 15% were defined as responders.

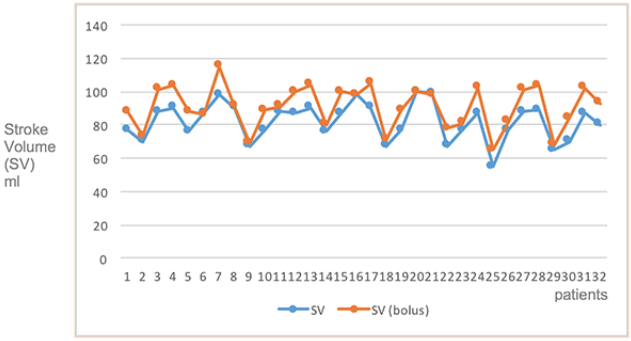
**Results:** SV and CO before volume loading was significantly correlated with change in SV (ΔSV) and in CO (ΔCO) after volume loading (ΔSV: $P<0.05$, $r2=0.523$; ΔCO: $P<0.05$, $r2=0.209$). Of the 32 patients, 19 (59.4%) were responders to intravascular volume expansion (increase in CO≥15%) and 13 (41.6%) were non-responders (increase in CO<15%). No significant change in heart rate or mean arterial blood pressure were observed.

**Results and discussion:** ClearSight is able to track hemodynamic changes induced by a fluid challenge providing a reasonable estimate of CO and SV. This non-invasive method allowed us a hemodynamic monitoring even in pregnant women without causing discomfort. The results of the study showed that during labor a fluid load resulting in a significant increase in CO and SV and highlights the risk of excessive fluid preload during labor analgesia (Figure 1).

**Conclusions:** A series of hemodynamic changes cannot be analyzed during labor analgesia with invasive methods. The use of the ClearSight can get reliable hemodynamic parameters and allow to avoid the risk of an excessive fluid load in this patient population.




Cardiac Output (CO) before and after 500 ml crystalloid bolu




Stroke Volume (SV) before and after 500 ml crystalloid bolus

*[Figure 1. Hemodynamic changes assessed by ClearSight System]*

## 04AP02-6

### Programmed intermittent epidural anaesthetic bolus for labour analgesia: a prospective randomized pilot study comparing two bolus rates

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**Background and Goal of Study:** Several studies have demonstrated that programmed intermittent epidural anesthetic bolus (PIEB) in combination with patient-controlled epidural analgesia (PCEA), compared with a continuous basal infusion with PCEA, reduce overall local anesthetic consumption and adverse effects without compromising analgesic efficacy. However the optimal bolus infusion rate is currently unknown.
In this randomized, double-blind, pilot study we compared analgesic efficacy, local anesthetic dosage and patient satisfaction with PIEB + PCEA administered at two different rates in labor analgesia: 150 ml/h (standard in our institution) vs 300ml/h.
**Materials and methods:** Uncomplicated, full-term parturients with cervical dilation <5 cm were eligible to participate in the study. After enrollment, an initial epidural ropivacaine 0,2% loading dose of 12 mL administered. Epidural analgesia was maintained with a solution of ropivacaine 0.1% with sufentanil 0.2 mcg/mL. Parturients were randomly assigned to receive PIEB (10 mL every hour beginning 60 minutes after the loading dose) with 5 ml bolus PCEA, lockout 15 min, maximum 10ml per hour; bolus rate 150 ml/h or 300 ml/h. Pain numerical rating scale (1-10), side effects (motor block using modified Bromage score) were assessed hourly and parturient's satisfaction; PCEA bolus, total/hourly anesthetic consumption, neonatal/obstetric outcomes and maternal satisfaction (1-10) were noted.
**Results and discussion:** We recruted 20 parturients (150 ml/h group= 8; 300 ml/h group= 12). There were no statistically significant differences between the two groups in patient characteristics, obstetric/neonatal outcomes and side effects.
Motor block was not observed. Pain scores were similar between groups 1.18 ± 1.1 vs 1.53 ± 0.766, $p$= 0,384. Ropivacaine consumption (mg/h) were very similar 12.1 ± 2.8 vs 12.07 ± 1.4, $p$= 0,678. The degree of parturient satisfaction was significantly higher in the 150 ml/h group (8.75 ± 1.05 vs 9.75 ± 0.46, $p$= 0.0479).
**Conclusion(s):** This study allows us to consider 300 ml/h bolus rate as an alternative in labour analgesia as compared to standard 150ml/h rate in our institution. The small size of our sample doesn't allow us to draw any definite conclusions regarding efficacy, safety or parturient satisfaction. Further studies are warranted.

## 04AP02-7

### The effect of the dose of bupivacaine on prolonged deceleration during intrathecal labor analgesia

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**Background:** Combined spinal epidural anesthesia(CSEA) is common for labor analgesia. It was reported that the uterine hyperactivity, spinal opioids and pain relief was related to fetal heart rate abnormalities in labor. But the effect of the intrathecal dose of local anesthetics on prolonged deceleration is unknown.
We hypothesized that the dose of bupivacaine also affected the fetal heart rate abnormalities, so we changed the dose of bupivacaine with fentanyl.
The aim of study was to determine retrospectively whether the dose of bupivacaine affected fetal prolonged deceleration without reducing the effect of pain relief.
**Methods:** Bupivacaine 2.5mg with fentanyl 10mcg were administered intrathecally for routine labor analgesia, but from May 2015, the providers chose the dose of bupivacaine with 1.5mg or 2.5mg.
Between May and October 2015, the full term (<37wks, >42wks) parturients in labor at our hospital were subjected to this study. They were divided into two groups (bupivacaine 1.5mg group and 2.5mg group). Those who received only epidural anesthesia and those carrying twin or a fetus with known congenital abnormalities were excluded.
A propensity matched controlled method was used to reduce selection bias with maternal age, height, body weight, body mass index, gestational age, cervical dilatation, status of membrane, use of oxytocin, and medical history (pregnant-induced hypertension, gestational diabetes mellitus, fetal growth restriction, myoma).
We compared the rate of prolonged deceleration in 30 minutes after intrathecally administered, the level of pain before and after analgesia, mode of delivery, the length of first and second phase, and the fetal outcomes. Pain score was assessed with a NRS.
Data were analyzed with nonparametric test and $\chi^2$ analysis. $P<0.05$ was considered significant.
**Results:** Three hundred and fifty-six pregnant women were enrolled, and 242 were selected by the propensity score matching (1.5mg group 141, 2.5mg group 141).
There were no significant differences in the incidence of prolonged deceleration (13.4% in 1.5mg group versus 7.1% in 2.5mg group, P=0.11), NRS before and after analgesia, the mode of delivery, the length of the first and second phase, and umbilical pH, BE, Apgar score<7.
**Conclusions:** There were no differences of the incidence of prolonged deceleration and labor outcomes between 1.5mg and 2.5mg of intrathecal bupivacaine for labor analgesia with CSEA.

## 04AP02-8

### Obstetric pain: visual analog scale (VAS) and numerical rating scale (NRS) are correlated and have a modest but comparable sensitivity to detect a relief after epidural analgesia (EA)

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**Background:** Excluding obstetric context, it has been shown that VAS and NRS were correlated, but this correlation (C) was stronger for lower pain scores compared with the highest scores (1). It has also been described a difference between the two scales in their ability to detect pain relief after treatment (1).
We conducted a survey on labor pain. The primary goal was to evaluate the C and the agreement between VAS and NRS and to evaluate the sensitivity of

these two scales to detect a relief after EA. The 2nd objective was to determine the preferred scale of patients.
**Materials and methods:** We conducted a prospective observational study in a category III maternity unit. Patients who wanted an EA for labor were included. 30 min before (BF) and after (AF) EA, patients were assessed by VAS and NRS at the peak of uterine contractions. 30 min AF the EA, they indicated their relief level giving the% pain reduction (R). For VAS and NRS, the % of pain R was calculated: 100 X ((score BF EA - score AF EA) / score BF EA).
Demographic and obstetric data were collected. Statistical analysis by correlation coefficient of concordance (CCC) and graphics with Bland and Altman (BA) limits of agreement (1.96 X SD).
**Results and discussion:** 97 patients were included. Main results are inTable. The CCC (95% CI) between the% R in pain reported by the patient and that calculated for VAS and NRS was respectively 0.7 (0.6-0.8) and 0.73 (0.6-0.8). Analyses of BA BF and AF EA are represented by Fig1 and 2. The bias (agreement limits) between% R in the reported pain and that calculated for the VAS and NRS was respectively, - 2.8 (31.2) and -1.2 (30.6). Preference was 16% and 66%, respectively for VAS and NRS. 18% had no preference.

Table : Parturients characteristics and main results (n = 97)

| VARIABLE | Mediane [IQR] , n(%) or Mean ± SD |
|---|---|
| AGE [yr] | 31 [29-35] |
| BMI ($kg.m^{-2}$) | 24 [21-26.6] |
| Nulliparous | 67 [69] |
| Spontaneous labour / Induced labor | 75 (77)/22(23) |
| Cervical dilatation at EA [cm] | 3 [2-4] |
| VAS before EA [0 – 10] | 7.2 ± 1.9 |
| NRS before EA [0 – 10] | 7.6 ± 1.7 |
| VAS 30 min after EA | 1.3 ± 1.6 |
| NRS 30 min after EA | 1.6 ± 1.7 |
| CCC [95%CI] between VAS and NRS before EA | 0.83 (0.7-0.9) |
| CCC [95%CI] between VAS and NRS 30 min after EA | 0.86 (0.8-0.9) |

BMI = Body mass index ; EA = Epidural analgesia ; VAS = Visual Analog Scale ; NRS = Numerical Rating Scale ; CCC = Correlation Coefficient of Concordance

Figure 1. BA for VAS and NRS before EA

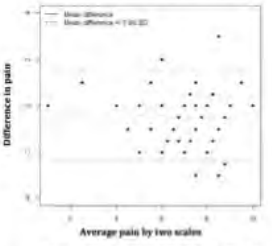
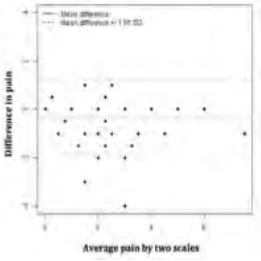



Figure 2. BA for VAS and NRS 30 min after EA




*[Table and Figures 1 and 2]*

This study shows a strong C between VAS and NRS for both severe pain and weak pain AF EA. The bias is small between the VAS and NRS either BFor AF EA since the average difference is close to 0 (-0.4 to -0.3). Two scales have a sensitivity to detect pain relief whith moderate C with pain R reported by patients.
**Conclusion:** VAS and NRS are equivalent and either may be used to evaluate labor pain. NRS is parturients' preferred scale.
**Reference:** 1. BMJ 200 ; 320 : 785-8

## 04AP02-9

### New option in epidural analgesia: first stage of labour is reduced by free movement of pelvis

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**Background and Objective:** During labour women adopt different positions and movements to control the pain of the contraction. It is present "free movement of pelvis" that women could adopt during labour, being the mechanism for the benefit of the mobile epidurals.
**Materials and methods:** 100 primiparous women who chose an epidural analgesia (EA) for their labour are enrolled in this observational cohort study between April 2013 to May 2014. EA was initiated with 8 ml levobupivacaine 0,125% plus 100mcg fentanyl, followed by a continuous infusion of 0,0625% levobupivacaine plus 2mcg/ml fentanyl at 12-15ml/h according to weight and height. We defined "free movement of pelvic " when woman is able to do pelvic anteversion and retroversion also sacral nutation and its opposite movement. Patients were divided into three groups: Group-A, women who had "free movement of pelvis"at any positions; Group-P, when women did not have "free movement of pelvis" in recumbent positions and Group-S, if women adopted sitting positions without a "free movement of pelvis". As statistical analysis, the $\chi 2$ test was used for nominal data and the one-way ANOVA for differences between the means.
**Results and discussion:** It was recruited 44 in Group A, 27 in Group P and 29 in Group-S). All groups were similar respect to maternal and general characteristics. It was observed significant differences between the groups according to duration of the first stage of labour (A:450 ±302, 92min, P:522,78 ±253, 63 min, S:622,76 ±355, 48min, p=0,030) and the amount of local anesthetic consumed (A:72,77 ±63, 86ml, P:97,04 ±64, 95ml, S:121,83 ±84, 46ml, p=0,017). Previous studies have found a reduction of the first stage in women who adopted different positions to recumbent positions, but they do not account how much time of pelvis in movement (1) or the amount of local anesthetic consumed (2). The "free movement of pelvis" at any position is more important than the position itself.
**Conclusion:** This study suggets that maternal positions with "free movement of pelvis" may positively influence in labour process cause of reducing maternal pain, labour length and caesarean section without affecting neonatal outcomes.
**References:**
1. Lawrence A et al. Maternal positions and mobility during first stage labour. Cochrane Database Syst Rev 2013;10:CD003934.
2. Gizzo S et al. Women's choice of positions during labour: return to the past or a modern way to give birth? A cohort study in Italy. BioMed Res Int. 2014;2014:638093.

## 04AP02-10

### Labour analgesia challenge - when epidural is not possible, what can we do?

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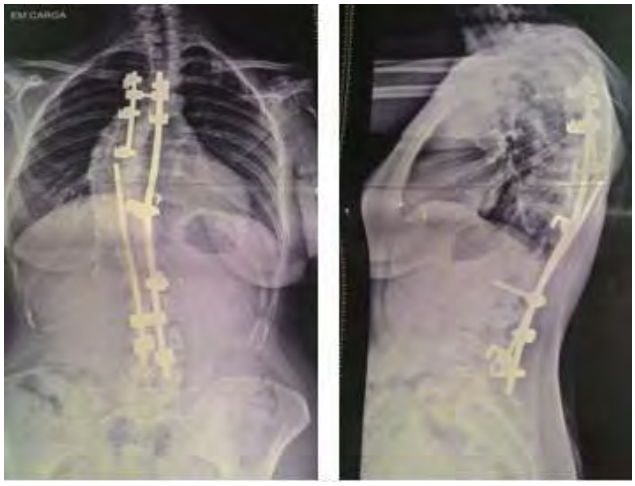
**Background:** Epidural analgesia remains the gold standard for labour, but in some situations cannot be used and an alternative method has to be considered.[1]
**Case report:** Pregnant 31 year-old female, 86kg and 1,63m, with severe scoliosis, submitted to posterior arthrodesis from cervical to sacral vertebrae, asked for labour analgesia.




*[X-ray images]*

Orthopedic evaluation suggested eligibility for eutocic delivery. The patient described abdominal and back irruptive pain (10/10). PCA-analgesia with remifentanil-bolus was started: 20$\mu$g/mL, 2min lockout and increasing bolus doses (15-40$\mu$g). The patient asked for 120 bolus, with 90 administrations (to-

tal dose: 2407μg) in 6h. Pain score decreased to 2/10. Vomiting was observed and resolved with ondansetron. After total cervix dilation, caesarean was performed under general anaesthesia, due to foetus-pelvic incompatibility. For postoperative analgesia a TAP block was performed, with successful pain relief. The baby had Apgar 10/10/10.

**Discussion:** Spontaneous vaginal delivery is considered one of the most painful experiences in women's life. Pain intensity depends highly on mother's physical and psychological factors. Severe pain adversely affects the parturient and foetus.[1] Remifentanil is a potent short-acting opioid rapidly metabolized by the mother and foetus, with suitable pharmacological profile for labour analgesia, providing adequate pain relief and high maternal satisfaction.[2,3] Maternal sedation and respiratory depression may occur, but with careful monitoring, it has a safe profile.[3]

**References:**

1. Joanna S,et all. Remifentanil for labour pain relief. Anaesthesiol Intensive Ther 2015,vol.47,no1,82-86
2. Schnabel A,et all. Remifentanil for labour analgesia:a meta-analysis of randomised controlled trials. Eur J Anaesthesiol.2012;29(4):177-85
3. Tveit TO,et all. Efficacy and side effects of intravenous remifentanil patient-controlled analgesia used in a stepwise approach for labour:an observational study. Int J Obstet Anesth.2013;22(1):19-25

**Learning points:** Remifentanil can be a safe and effective alternative to epidural in labour analgesia, when this technique is not possible. Careful monitoring to prevent complications is essential.

## 04AP02-11

### Ketamine for labour analgesia: case report

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**Background:** Ketamine is a powerful anesthetic rarely used nowadays due to its severe adverse effects, particularly those affecting the Central Nervous System.[1]

It's analgesic properties are also well acknowledged. Recent studies demonstrated that a low-dose ketamine perfusion provides efficient analgesia in the perioperative period, and this has stirred the interest for its use in labour analgesia.[2,3]

This case report describes the use of ketamine for labour analgesia in a parturient with thrombocytopenia.

**Case report:** 29 y.o. parturient, ASA II, admitted in labour due to premature rupture of membranes.

She had a platelet count of $84x10^9$/L and we decided not to perform the epidural.

We initiated an intravenous perfusion of ketamine, starting with a loading dose of 0,2mg/kg during 30 minutes, followed by a perfusion of 0,2mg/kg/h.

Maternal vital signs, pain and sedation scores and fetal heart rate were registered. Special attention was given to the presence of adverse effects.

We started on the first stage of labour. Pain score was 8/10 according to visual analogue scale (VAS). After 30 minutes, pain score was 1/10 (VAS). During the 2nd and 3rd stages, pain scores kept between 1-2/10 VAS.

No maternal or fetal haemodynamic changes occurred,

It was an eutocic delivery, the newborn had an Apgar Score of 1'9 / 5'10.

**Discussion:** The present case report is in agreement with the latest studies in which low-dose ketamine allows a satisfactory relief of labour pain without interfering with its progression or the newborn's wellbeing. [2,3]

It can be considered a safe technique, since a parturient/nurse ratio of 1:1 is not necessary, and it is not associated with excessive sedation or respiratory depression.

**References:**

1. Pai A, Heining M. Ketamine. *Continuing Education in Anaesthesia, Critical Care & Pain.* 2007;7(2):59-63.
2. Joel S JA, Cherian VT, Nandhakumar A, Raju N, Kaliaperumal I. . Low-dose ketamine infusion for labor analgesia: A double-blind, randomized, placebo controlled clinical trial. *Saudi Journal of Anaesthesia.* 2014;8(1):6-10.
3. Jagatia K, Mehta J, Patel N. Low dose ketamine for painless labour- A comparative study of 100 patients. *International Journal of Medical Science and Public Health.* 2013;3(1):707

**Learning points:** In cases which epidural analgesia is contraindicated, ketamine might present as an alternative to opioids. However, more studies are needed to validate the technique.

## 04AP03-1

### Is the effective dose 50 of Sugammadex to reverse neuromuscular block lower in pregnant women than in non-pregnant? Preliminary data

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**Background and Goal of Study:** The dose alteration of Sugammadex necessary in order to reverse the level of neuromuscular blockade at a train-of-four count of two during pregnancy is unknown. We aimed to find the effective dose 50 (ED50) of Sugammadex required to reverse this neuromuscular blockade depth in pregnant at term and non-pregnant women using the Dixon Massey up-and-down method (1)

**Materials and methods:** After informed patient consent and institutional review board approval, 30 healthy pregnant women at term scheduled for elective caesarean section (Group P) and 30 healthy women scheduled for minor laparoscopic surgery (Group L) were recruited.

After 3min of preoxygenation and anesthesia induction with Thiopental, all women received a single bolus dose of Rocuronium 0.8mg/kg, followed by maintenance doses (Rocuronium 0.15mg/kg) as needed. Neuromuscular blockade was monitored using kinemyography.

After the last dose of Rocuronium and at train-of-four count of two, a single bolus dose of Sugammadex was administered. The primary efficacy variable was the recovery of T4/T1 ratio of 0.9, at 5min after sugammadex administration.The dose of Sugammadex was given according to the Dixon and Massey up-and-down method (1).

The dose for the first patient in each group was 0,5mg/Kg. An ineffective dose was defined as recovery of the T4/T1 ratio <0.9 in 5min and this mandated an increase of 0.1mg/Kg to the next woman and vice versa. The ED(50) was calculated using the method of Dixon and Massey. In pregnant women the prepregnacy weight was used for the dose calculations

**Results and discussion:** Age and anthropometric variables were similar for both groups. The Sugammadex ED50 for neuromuscular blockade reversal in group P was calculated as 0,97mg/Kg with SD 0.12mg/Kg, SE 0.03mg/Kg and Confidence Interval (CI) 95% 0.92-1.03mg/Kg, whereas in group L respective values were 1.31 mg/Kg (SD: 0.22mg/Kg, SE: 0.05mg/Kg, CI 95%: 1.22-1.40mg/Kg), which was statistically significant (t-test, $p<0.001$). There were no adverse effects related to the study treatments.

**Conclusion(s):** The effective dose 50 (ED50) of Sugammadex required to reverse the level of neuromuscular block at a train-of-four count of two in term pregnancy seems to be about 25% lower in pregnant women than in non-pregnant

**Reference:**

1. Dixon WJ, Massey FJ. In: Introduction to statistical analysis. 1983:426-41

## 04AP03-2

### Anaesthetic management of a parturient with becker's myotonia congenita using propofol, rocuronium and sugammadex

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**Background:** Becker's Disease is an autosomal recessive type of myotonia congenita. Worldwide prevalence is about 1/100000. It is linked to mutations in CLCN1, the gene encoding skeletal muscle chloride channel. It reduces flow of chloride ions during repolarization and leads to sustained muscle contractions. Typical clinical symptoms are myotonic stiffness and "warm-up" phenomenon.
**Case report:** 27 year old primipara with homozygote recessive mutation in CLCN1 (c.1437_1450del,p.480HfsX24) was indicated to elective caesarean section in 40 gestational week. In personal history she had thoracic stabilisation for scoliosis and hypothyreosis. We decided to provide the general anaesthesia with propofol in TCI mode (Schnider mode, $C_e$=effective concentration 5 mcg/ml) and rocuronium 1 mg/kg IV for rapid sequence induction, monitoring the depth of neuromuscular blockade (NMB) on TOF WATCH SX device. The male newborn (APGAR score 9-10-10) with no signs of pathology in acid-base balance in arterial umbilical blood was delivered. At the end of surgery ($C_e$=1 mcg/ml, TOF=0, PTC=0) we administered sugammadex 4 mg/kg IV. It takes 2 min and 15 sec to reach TOF ratio 90% and subsequent extubation. After extubation she was breathing adequately, communicative, transferred to the recovery room and after two hours with no signs of residual NMB or respiratory problems back to the gynaecological ward to the monitored postoperative room. She was discharged home on 4th day.
**Discussion:** To the best of our knowledge, this is the first report of anaesthetic management of a parturient with Becker's myotonia congenita who underwent CS under general anaesthesia. In this case we wanted to aware of using malignant hyperthermia (MH) triggering drugs, though the association with MH has been regarded as highly unlikely, suxamethonium which can cause total body rigidity and subsequent difficult airway management and neostigmine which can cause myotonic response. Since there can be also increased sensitivity to non-depolarizing neuromuscular blocking agents we monitored the depth of NMB.
**Learning points:** This case shows the possibility of using propofol with rocuronium for caesarean section in a parturient with Becker's myotonia congenita with the use of sugammadex for safe and rapid reversal of NMB. This enables standard maternal care for newborns to high risk parturients.

## 04AP03-3

### Thiopental *vs* propofol for obstetric GA: a survey of current practice

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**Background and Goal of Survey:** The use of thiopental as induction agent for obstetric GA was first described by Hodges[1]. A national survey[2] published in IJOA 2013 showed that even though thiopental was still agent of choice 58% would support the use of propofol instead. Following publication of NAP5[3] and MBRRACE -UK[4] we surveyed the opinions and practice of anesthetists in KSS and London deanery in order to profile the current practice in obstetric general anaesthesia.
**Materials and methods:** An online survey was sent to trainees and consultants in the London and KSS deanery. We aimed at collecting replies from 80 anaesthetists of various grades with experience in Obstetric Anaesthesia.
**Results and discussion:** The response rate was 78%(63/80) out of which 84%(53) used thiopental as induction agent and propofol was used by remaining 16%(10). 56% of responders had experience of using both thiopental and propofol as induction agent in obstetric anaesthesia. Around 99% had experience with thiopental outside obstetric settings. 54% of responders would use thiopental and 46% would use propofol as induction agent for obstetric GA if choice was based on personal preference rather then a protocol.
**Conclusion(s):** Our survey has shown thiopental still being the drug of choice for obstetric GA. However, more then half of responders had experience of using both thiopental and propofol in obstetric setting. If given a choice to which induction agent to be used thiopental would be used by only slightly more than half.
**References:**
1. General anaestheia for operative obstetrics: with special reference to the use of thiopental and suxamethonium.*Hamer Hodges RJ, Bennett JR, Tunstall ME, Knight RF* Int J Obstet Anesth. 2013.
2. Choice of anaesthetic agents for caesarean section: a UK survey of current practice. *Murdoch H Scrutton M, Laxton CH*. Int J Obstet Anesth. 2013.
3. Accidental Awarenessduring General Anaesthesia in the United Kingdom and Ireland. The 5th National Audit Project of RCOA and AAGBI. Plaat F, Lucas DN, Bogod DG. AAGA in obstetric anaesthesia. In: Pandit JJ,Cook TM,eds
4. MBRRACE UK.Saving Lives, Improving Mothers' Care Lessons Learned to Inform Future Maternity Care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009-12 .*Yentis S, Clyburn P, Knight M, Kenyon S, Brocklehurst P, Neilson J, Shakespeare J, Kurinczuk JJ, eds* Oxford:National Perinatal Epidemiology Unit, University of Oxford, 2014:

## 04AP03-4

### General anesthesia with target controlled infusion of propofol and remifentanil for planned caesarean section in a parturient with unruptured intracranial aneurysm

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**Background:** The incidence of cerebral aneurysm in pregnancy is similar to that in the general population (2%), but its rupture is more common during pregnancy.[1] In a planned caesarean section the main question is whether to perform general or spinal/epidural anesthesia, but there are no formal recommendations or guidelines regarding which technique to choose and very few cases have been reported. We report such a case and discuss its management.
**Case report:** The choice was to perform general anesthesia. Remifentanil (Remi) by effect site Target Controlled Infusion (TCI) was started at a concentration effect (Ce) of 2,5ng/ml before placement of an arterial line. Propofol was given slowly until loss of conscience and then by effect site TCI. Remi was increased to 4 and rocuronium was given. After tracheal intubation Remi was stopped and propofol titrated to Bispectral index (BIS) 40 to 60. Mean arterial blood pressure was 91 and 104 mmHg before and after intubation. 9min after intubation, a 3395g fetus was born. Apgar scores were 5 and 9 at 1 and 5 min. Assisted mask ventilation was required for 1,75min. The Remi Ce at umbilical cord clamping was 2,0 ng $ml^{-1}$, and was then increased.
**Discussion:** Spinal anesthesia was not used because lumbar punctures have been associated with aneurysm ruptures.[2]
Epidural anesthesia could be an option, but the danger of lumbar puncture could not be excluded. General anesthesia implies tracheal intubation with the risk of sympathetic activation. Opioids obtund this response, but may depress the fetus. Both intubation and skin incision represent powerful noxious stimuli that may result in aneurysm rupture. Remi, given its rapid action, is a good option. Remi by TCI allows tight control of concentrations and allowed us to provide safe maternal anesthesia without harming the fetus.[3]
Food and Drug Administration information says that Remi Ce of 2ng/ml does not cause respiratory depression in the adult. In the fetus Remi elimination is fast.
**Referencies:**
1. Rev Neurologique 2008; 164: 781-786;
2. Indian J Anaesth 2002; 46: 386-390;
3. International Journal of Obstetric Anesthesia 2004; 13: 153-158.
**Learning Points:** In a cesarean section in a parturient with a cerebral aneurysm, total intravenous anaesthesia with TCI of remifentanil allowed titration of the opioid concentration in order to obtund sympathetic responses to intubation and incision providing safe maternal anesthesia without depressing the fetus.

## 04AP03-5

### General anaesthesia for cesarean section: Is thiopental missing?

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**Background and Goal of Study:** In obstetric anaesthesia, sodium thiopental was routinely used for caesarean section (CS) under general anaesthesia. Since May 2011, sodium thiopental production has been stopped in France. Therefore, propofol was used instead of thiopental in this situation. The best induction agent choice remains controversial and limited comparative studies are available, mainly in case of emergency.
The objectives of this study were to compare the effects of propofol *versus* thiopental on the neonate's outcome after elective and emergency CS.
**Materials and methods:** This comparative before/after trial analyzed retrospectively neonates from ASA I and II pregnant women delivered from 2009 January to 2013 December by elective or emergency cesarean section in a French teaching hospital. Two periods, according to the hypnotic drug, was compared: before May 2011 (thiopental) and after (propofol). The primary outcome was the Apgar score at 1, 5 and 10 minutes, the secondary outcomes were the arterial umbilical pH and the admission rate in a neonatal care unit. Results are expressed in median, chi2 was performed for comparisons. A $p < 0.05$ was significant.
**Results and discussion:** 367 newborns were included, n=178 in thiopental (6.2 ± 1.8 mg/kg) and n=189 in propofol (3.5 ± 0,9 mg/kg) periods. Demographic characteristics of parturients were similar in both periods. The Apgar score was higher during thiopental than propofol period with 7 (2-9) *vs* 5 (2-8) (p=0.01) at 1 minute; 9 (6-10) *vs* 7 (6-9) (p=0.002) at 5 minutes but similar at 10 minutes. For emergencies CS with extraction time <10 min or 10-60 minutes, Apgar score was higher during thiopental period, but only at 1 minutes, 8 (4-9) vs 6 (3-9) (p=0.016), and when extraction time was 10-60 min. Blood gases analyses and admission rate of neonates in care unit were similar between the two periods whatever the timing of CS.
**Conclusions:** These results suggest both thiopental and propofol may be used for caesarean section under general anaesthesia but the place of thiopental instead of propofol has to be prospectively assessed. Because we did not find any difference at 5 minutes for CS in emergency, the deleterious effect of propofol for the neonate is probably low.

## 04AP03-6

### Does epidural labor analgesia for women advanced maternal age increase the risk of caesarean section?

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**Background and Goal of Study:** Advanced maternal age at estimated delivery date has become increasingly common in all over the world. It is well established that epidural labor analgesia is not related to the increase of caesarean delivery rate. On the other hand, advanced maternal age is reported as the independent risk factor for caesarean delivery. There is no study which assessing the association between maternal age and caesarean delivery rate with epidural labor analgesia.
The aim of this study is to determine whether epidural labor analgesia increase the risk of emergency caesarean delivery in women aged over 40.
**Materials and methods:** We performed retrospective study on women aged over 40 between 36 and 42 week's gestation delivering at our hospital from Oct 2009 to Oct 2014. Women who had contraindications to labor, including a prior cesarean delivery, were excluded. We analyzed demographic data, factors related to the risk for cesarean deliver, complications and outcome of labor. $\chi^2$ test and used for qualitative data and $p<0.05$ was considered significant.
**Results and discussion:** In these 5 years, all delivery was 8164 and delivery of the maternal age over 40 was 703 (8.6%). Among them, 225 was excluded because of contraindication to labor, elective caesarean section, abortion and delivery for the fetal reason. The overall caesarean rate for this population was 19% (n=91) and the rate of epidural analgesia was 7.7% (n=37). In non-epidural group (n=441), 82 patients (18%) required caesarean delivery, whereas 14 patients (37%) had caesarean section in epidural group. ($P<0.05$).
**Conclusion(s):** Our fining suggests that epidural labor analgesia for women aged over 40 may increase the risk for caesarean delivery. Although causal relationship should be examined in more randomized trial, prenatal care providers should discuss the risks and benefits of epidural analgesia with patients especially for these age group.

## 04AP03-7

### The effect of anaesthetic technique on neonatal morbidity in emergent caesarean section for fetal distress: a prospective observational study

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**Background and Goal of Study:** Emergent Caesarean section is an important area of challenge for an anaesthesiologist. The decisions of the anaesthetic technique can be of paramount importance. In the literature there are few studies assessing the neonatal morbidity for fetal distress diagnosed emergent caesareans. The aim of our study is to evaluate the effect of anaesthetic technique on neonatal morbidity in emergent caesareans diagnosed for fetal distress.
**Materials and methods:** Our article is a single centred prospective observational study which was approved by Bakirkoy Dr. Sadi Konuk Education and Research Hospital Clinical Studies Ethical Committee (Study protocol code: 2015/127). We enrolled pregnant patients who were diagnosed as fetal distress, aged 18-45 and BMI<40. When the patient was diagnosed for fetal distress and urgently moved to operating room, the senior anaesthetist decided the type of anaesthesia according to national guidelines and patients' approval. Then we divided the patients into two groups (group G and group R). All gravidas' hemodynamic data were recorded during surgery. We acquired neonatal data including APGAR scores in 1st, 3rd, 5th minutes, and umbilical blood gas (if indicated). After the operation we followed the neonates until discharge and recorded any morbid conditions. We defined morbidity as 5-minute Apgar score (APGAR5) <7, any need for mechanical ventilation, any neonatal intensive care unit entrance and any respiratory insufficiency symptoms.
**Results and discussion:** 61 patients were included in the study. We applied regional anaesthesia to 31 patients and 5 (19,2%) of neonates' had morbidity. In general anaesthesia group (n:30) morbidity was detected for 9 (30%) cases. We did not detect any significant difference in terms of morbidity and length of hospital stay. ($p>0,05$) We recorded a significantly diminished 1st minute APGAR scores ($p=0,045$) with general anaesthesia but we did not determine this reduction for 3rd and 5th minute APGAR scores. ($p>0,05$). We found a significant reduction in heart rate in the 10th, 20th and 30th ($p=0,032$, $p= 0,001$and $p=0,034$ respectively) minutes in regional anaesthesia group.
**Conclusion:** We could not find any data that regional anaesthesia is superior to general anaesthesia regarding neonatal morbidity for emergent caesareans section. We think that both techniques can safely be applicable for fetal distress diagnosed emergent caesareans in terms of neonatal morbidity.

## 04AP03-8

### Does Sevoflurane influence cognitive function recovery after caesarean section?

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**Background and Goal of Study:** Postoperative cognitive dysfunction could occur following obstetric interventions such as caesarean section (CS) or vaginal delivery and have consequences on the mother and the child[1] and can be grounded on general anesthesia (GA) agents.[2]
The aim was to determine the effect of sevoflurane on cognitive function (CF) of women delivered by CS.
**Materials and methods:** Having agreed with the local Ethics Committee and obtained the informed consents, 64 women (who delivered by the CS) were examined. After GA was induced with propofol (2 mg/kg) the women were randomized into 2 groups: IA (n=30) GA with sevoflurane 1.3vol% in 50%

oxygen, and TIVA (n=34) GA with propofol 0.1 mg/kg/min. Both groups were similar in relation to age, education, physical status (ASA I-II), intraoperative blood loss, surgery duration, initially reduced CF.
CF were assessed by Montreal Cognitive Assessment scale (MoCA) and Cognitive Failure Assessment (CFQ) test, Memory by Luria test, Control functions by Alternating Trail Making test (ATM), praxis by Clock Drawing Test (CDT). Timepoints: before delivery (baseline), at day 1st, 3d, 7th, 28th and 46th after CS. Data are presented as mean±SD or % mothers with parameters lower the norm. Mann-Whitney U test was used for statistical analysis, *p<0.05 was considered as statistically significant for comparison between groups IA vs TIVA.
**Results and discussion:** Results are presented in table1. There were normalization of CF in general (MoCA) and control functions (ATM) till 3d day after CS in IA. These functions were not recovered to normal even till 7th day in TIVA group. Memory (test Luria) and praxis (CDT) recovered till 3d day after the surgery regardless of anesthetic agent. CF in IA group were completely recovered (CFQ) by 46 day after CS. At the same time, 35.5±3.3% of women had persisted violations of CF after TIVA.

| | group | baseline | 1 day | 3 day | 7 day | 28 day | 46 day | Regional norm |
|---|---|---|---|---|---|---|---|---|
| MoCA | IA/ TIVA | 23.2 ±2.0 23.7 ±0.4 | 24.0 ±1.2 23.9 ±1.2 | 26.0 ±1.5 24.2 ±1.0* | 27.3 ±1.2 24.6 ±1.1* | | | 26.6 ±1.1 |
| Luria test | IA/ TIVA | 6.8±1.1 7.1±0.2 | 7.2±0.9 6.6±1.2 | 8.0±0.6 8.5±1.3 | 8.7±0.5 8.0±1.4 | | | 8.2 ±1.1 |
| ATM | IA/ TIVA | 151.6 ±28.2 151.1 ±7.6 | 123.1 ±21.2 119.0 ±47.7 | 87.1 ±19.8 114.1 ±21.7* | 79.7 ±14.4 112.3 ±15.2* | | | 95.1 ±25.0 |
| CDT | IA/ TIVA | 1.7±0.8 1.6±0.7 | 1.7±0.8 1.6±0.7 | 1.6±0.7 1.6±0.7 | 2.0±0.6 2.0±0.7 | | | 2.1 ±0.7 |
| CFQ | IA/ TIVA | | | | | 35.5 ±4.5% 52.9 ±6.1%* | 10.0 ±1.3% 35.5 ±3.3%* | ≤10 ±1.5% |

*[Table 1]*

**Conclusion(s):** Anesthesia with sevoflurane provides rapid recovery of the initial decreased cognitive functions in women after caesarean section.
**References:**
1. Ghosh S. EJA 2012;29(2):61-63.
2. Papaioannou A. et al. EJA 2005;22(7):492-499.

## 04AP03-9

### Improving the safety profile of anaesthetics delivered for Category 1 emergency Caesarean sections: An audit of response times and mode of anaesthesia administered

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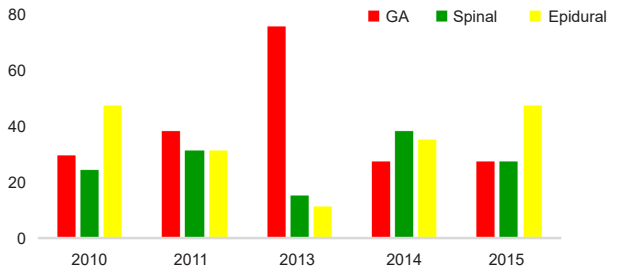
**Background:** Category 1 Caesarean sections (LSCS) are undertaken if there is an immediate threat to the life of the mother or fetus. The NICE recommended standard is delivery within 30 minutes from the time that a category 1 section is declared. The preferred mode of anaesthesia for caesarean section is a regional technique. General anaesthesia (GA) is associated with an increased risk of maternal morbidity and mortality[1].
**Methods:** We audited decision to delivery times in our trust and whether we were meeting standards and also took into consideration the type of anaesthetic administered to patients undergoing a category 1 LSCS. As the data collected highlighted an alarming number of patients undergoing GAs, we implemented some changes followed by re-audit to complete the cycle. Here, we present our results.
**Results:** Our initial audit in 2013 demonstrated that over 90% of patients undergoing a category 1 LSCS met the NICE recommended 30 minute decision to delivery time frame. However, the most striking finding was that over 70% of patients were undergoing GAs.
We put forward some suggestions to implement change. These included:
1. Immediately commencing intra-uterine resuscitation and transferring the patient to theatre allowing the anaesthetist to conduct a preassessment,
2. Perform a ‚rapid sequence spinal' (if no regional block already in place).
3. Siting an early epidural in patients with a higher chance of requiring a LSCS.
A re-audit then occurred in 2014/2015. We were pleased to discover that the GA rates had fallen profoundly and that over 70% of category 1 LSCS patients received regional blockade (*Figure. 1).*




*[Figure1. Percentage of category 1 LSCS patients undergoing either a GA, spinal or epidural top-up (y axis)]*

**Discussion:** A regional technique is preferred for patients undergoing a LSCS. We were concerned about the vast quantity of patients receiving a GA for category 1 LSCS. Hence we introduced some ideas for contemplation by fellow peers. Following completion of the audit cycle we fulfilled our objective of reducing GA rates profoundly, thereby improving patient safety.
**Reference:**
1. CEMACH. Centre for Maternal and Child enquiries www.cmace.org.uk

## 04AP04-1

### The effect of right versus left lateral-tilt position on compression of the inferior vena cava in parturients

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**Background:** The left lateral-tilt position has become an established practice of obstetric anesthesia since the 1970s, especially after the study by Crawford et al., who reported the significant improvement in the fetal acid-base status when a cushion was placed under the hip of mother to tilt the pelvis to the right or to the left under general anesthesia. We recently reported that of a 30° left-lateral tilt, but not a 15° tilt, partially relieves compression of the inferior vena cava (IVC) in parturients at term without anesthesia.[1] The effect of right lateral-tilt position on the IVC compression, however, in unknown. Here, we used magnetic resonance imaging to examine the effect of the right lateral-tilt position on the IVC compression.
**Methods:** Magnetic resonance images of 7 singleton parturients (37 weeks gestation) were obtained for observation of the inferior vena cava and aorta in both the supine, left lateral-tilt positions (15°, 30°) and right lateral-tilt positions (15°, 30°) with head to toe placement of a 1.8-m long hard V-block constructed of closed-cell polyethylene foam under the right side of the parturient's body.
**Results:** Aortic volume did not change in any of positions. The IVC volume in the left lateral-tilt position was not increased at 15° (3±2 vs. 5±3 ml), whereas the corresponding values at 30° were significantly increased (11±9; $P<0.05$), compared with the supine position. Similarly, the IVC volume in the right lateral-tilt position was not increased at 15° (5±3 ml), whereas the corresponding values at 30°were significantly increased (6±2; $P<0.05$). Although the IVC volume at the 30° right lateral-tilt position was tended to be lower than the corresponding value in the left-lateral tilt position, the difference was not statistically significant ($0.05<P<0.1$).
**Conclusions:** These findings indicate that both left and right lateral-tilt position at 30°, but not 15°, were effective for reducing compression of the IVC, consistent with our previous report.[1]
**Reference:**
Anesthesiology 2015;128/286

## 04AP04-2

### Use of Hyperbaric versus isobaric bupivacaine in spinal anaesthesia for caesarean section: a systematic review

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**Background and Goal of Study:** Bupivacaine is used in hyperbaric and isobaric forms and several trials have not conclusively shown benefit of either. This updated systematic review is to determine the effectiveness and safety of hyperbaric bupivacaine compared to isobaric bupivacaine for spinal anaesthesia in women undergoing caesarean section.
**Materials and methods:** We searched CENTRAL, MEDLINE, EMBASE and handsearched journals till 2010. For this update, we reran our search from January 2011 to January 2015. We included randomized controlled trials involving parturients undergoing spinal anaesthesia for elective caesarean section that compared the use of hyperbaric with isobaric bupivacaine. The number of events and the sample sizes in each outcome, risk ratios (RR) for binary outcomes and mean differences (MD) for continuous outcomes were reported.
**Results and discussion:** This update has 10 trials comparing anaesthesia performed with hyperbaric and isobaric bupivacaine showing similar need for conversion to general anaesthesia (RR 0.33, 95% CI 0.09 to 1.17, 614 participants, *low quality of evidence (QOE)*). Nine trials showed no difference in the need for supplemental analgesics (RR 0.61, 95% CI 0.26 to 1.41, 554 participants, *low QOE*). Four trials comparing requirement of ephedrine showed no difference (RR 0.89, 95% CI 0.57 to 1.38, 256 participants, *low QOE*). Seven trials showed no difference in nausea and vomiting (RR 0.99, 95% CI 0.57 to 1.72, 433 participants, moderate *QOE*). Three trials showed no difference in headache (RR 1.82, 95% CI 0.47 to 6.99, 234 participants, *low QOE*). Three trials showed no difference in high block (RR 0.88, 95% CI 0.16 to 4.90, 205 participants, moderate *QOE*). Two trials showed that the time till sensory block to T4 was also shorter with hyperbaric bupivacaine (MD -1.06 minutes, 95% CI -1.80 to -0.31, 128 participants). Six trials showed no difference in amount of ephedrine use (RR 0.23, 95% CI 1.65 to 2.12, 386 participants).
**Conclusion(s):** This updated review found that intrathecal hyperbaric bupivacaine had a more rapid onset of sensory blockade at the T4 level than isobaric bupivacaine. There is similar need for conversion to general anaesthesia and supplemental analgesia.
**Reference:**
Sia AT et al. Use of Hyperbaric versus Isobaric Bupivacaine in Spinal Anaesthesia for Caesarean Section. Cochrane Database Syst Rev. 2013 May 31;5. Javed et al. 2014. Punshi et al. 2012. Saracoglu A et al. 2011.

## 04AP04-3

### The use of intrathecal hyperbaric lignocaine for obstetric anaesthesia in the resource-poor environment

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**Background:** Lignocaine is no longer advocated for intrathecal administration due to the increased incidence of Transient Neurological Symptoms (TNS). A Cochrane review in 2005 (1) determined this syndrome occurred in 0-30% of cases.
In the resource-poor environment, intrathecal lignocaine is still practiced as bupivacaine is not readily available. A short duration of block is advantageous resulting in minimal post-operative monitoring, less intra-venous fluids, minimised post-operative catheterisation and early mobilisation.
**Aim:** To audit the use of lignocaine for spinal anaesthesia in obstetrics, in particular the incidence and impact of TNS.
**Method:** Patients undergoing Caesarian section during a 1 month period at the Maternal Hospital in Lilongwe in Malawi were included. The timing of anaesthesia, level of block achieved, time to first mobilisation and complications within 24 hours were documented. Use of local nursing staff and medics were required for translation purposes.
**Results:** 72 patients underwent caesarean section during this period. Anaesthesia was provided with a dose of 1.5 mls of hyperbaric 5% lignocaine via a 25g Sprotte needle.
8.3% (6 out of 72) required GA as a result of inadequate block due to surgery duration over 45 minutes. The average duration of the block for anaesthesia was 52 minutes. The average duration for return of lower limb power was 138 minutes.
TNS occurred in 3 cases (4.2%). The symptoms persisted for an average of 32 hours. There was no abnormality on neurological examination at 24 hours and 72 hours.

| Patients with TNS | Onset of symptoms | Duration of symptoms | Severity | Location of pain | Analgesia | Mobilisation reduced |
|---|---|---|---|---|---|---|
| 1 | 24 h | 48 h | Mod | Buttocks | Pethidine 50 | n |
| 2 | 18 h | 24 h | Severe | Thighs | n | y |
| 3 | 24 h | 24 h | Severe | Buttocks | Pethidine 50 | n |

*[Table 1. Patients with TNS]*

**Conclusion:** The incidence of TNS in this patient group was 4.2%. All symptoms were transient and resulted in no prolonged morbidity. The advantages in this clinical setting of early recovery and mobilisation may be important. Lignocaine spinal anaesthesia may be beneficial in a resource-poor environment and not just performed due to necessity.
**Reference:**
D Zaric et al. Transient neurological symptoms (TNS) following spinal anaesthesia with lidocaine versus other local anaesthetics. Cochrane Database of Systematic Reviews 2005 issue 4.

## 04AP04-4

### Comparison of continuous IV phenylephrine vs. norepinephrine infusion in prevention of spinal hypotension during caesarean delivery: assessment of hemodynamic parameters and maternal outcomes

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**Background and Goal of Study:** Hypotension is common under spinal anesthesia (SA) for caesarean delivery (CD). Phenylephrine is currently the vasopressor of choice in this setting but may cause baroreceptor-mediated bradycardia. We compared the efficacy of phenylephrine and norepinephrine infusions for CD under SA.
**Materials and methods:** In this prospective randomized study, 85 parturients for CD under SA were randomized to Group P (phenylephrine infusion 0.1 mcg/kg/min) or Group N (norepinephrine infusion 0.05 mcg/kg/min) to maintain systolic blood pressure within 100-120% of baseline. Measured variables included Blood Pressure (BP), number and type of provider interventions to control blood pressure, Heart Rate (HR), Cardiac Output (CO), Cardiac Index (CI), Stroke Volume (SV), Systemic Vascular Resistance (SVR) as measured by a noninvasive hemodynamic monitor, APGAR scores, and maternal nausea and emesis.
**Results and discussion:** No differences were noted between groups in duration of vasopressor infusion (69.24 ± 18.56 min Group P vs. 66.65 ± 21.57 min Group N; $P=0.57$), incidence of hypotension (63.2% Group P vs. 51.2% Group N, $P=0.53$), bolus interventions (24 Group P vs. 22 Group N, $P=0.28$), total bolus dose of phenylephrine (146.05 ± 200.47 $\mu$g Group P vs. 163.95 ± 207.69 $\mu$g, $P=0.31$), measured hemodynamic parameters (SBP $P=0.25$, DBP $P=0.15$, HR $P=0.17$, CO $P=0.5$, CI $P=0.84$, SV $P=0.5$, and SVR $P=0.54$), incidence of maternal nausea (63.2% Group P vs. 51.2% Group N, $P=0.53$), incidence of maternal emesis (26.3% Group P vs. 16.3% Group N, $P=0.53$), incidence of bradycardia (13.2% Group P vs. 18.6% Group N, $P=0.71$), and 1 minute APGAR scores ($P=0.20$). More boluses of ephedrine were required in Group P (5.39 ± 15.5 mg) compared to Group N (0.70 ± 4.57mg, $P = 0.01$) and 5 minute APGAR scores were statistically better in Group P ($P=0.05$) but most likely not clinically significant.
**Conclusion(s):** Both medications are efficacious as prophylactic infusions for the prevention of maternal hypotension under SA. If continuous phenylephrine is used, more intermittent ephedrine may be required secondary to reflex bradycardia.
**References:**
1. Ngan Kee WD, Khaw KS, Ng FF. Phrophylactic Phenylephrine Infusion for Preventing Hypotension During Spinal Anesthesia for Caesarean Delivery. *Anesth&Analg.* 2004;98:815-21.
2. Akkermans J, et al. Continuous Non-Invasive Blood Pressure Monitoring, a Validation Study of Nexfin in a Pregnant Population. Hypertension in Pregnancy, 28:230-242, 2009.

## 04AP04-5

### Effect of 0.5% heavy bupivacaine at room temperature vs body temperature on shivering after spinal anaesthesia in patients undergoing Caesarean section

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**Background and Goal of Study:** Shivering is very common unwanted effect associated with spinal block block with incidence upto 40-60% (1). Etiology is still not proven with no definitive treatment (2).
Mirzaie et al. Have shown that bupivacaine adminstered at room temperature was associted with significantly lower incidence of shivering than that given at 4 c.
In our study we evaluate the effect of warm (at body temperature ) versus cold (room temperature 23 c) 0.5%heavy bupivacaine on postspinal shivering undergoing caesarean section.
**Materials and methods:** In this prospective randamized double blinded study; after getting the ethical issue commettee, 100 patients selected in tow groups 50 each , randamized using closed envelop technique, body temperature group (BT) recieved local anaesthetic warmed using tissle kit warmer machine to 37 c, the room teperature (RT) recieved medications with usual methods, patient core temperature with tympanic probe; block height, blood pressure and heart rate, shivering intesity grades (1-4) according to scale develpped by Crossley and Mahajan (3); side effects like nausea and vomiting, itching, Apgar score and blood loss recorded. Chi-square test used with $p<0.05$ was considered statistically significant.
**Results and discussion:** Out of 50 patients in each group, shivering was seen in 7 (14%) and 31 (62%) patients in BT and RT group respectively, intensity of shivering >3% observed in 15 (30%)patients of RT group and 5 (10%) patients in BT group, core temperature was 1 degree less in RT than BT group; no difference in the amount of blood loss, heart rate and blood pressure and Apgar score. Pruritus was significantly higher in RT group with $p<0.05$.
The thermoregulatory control is impaired with spinal block by blocking the tonic vasocontriction which is essential foer temperature regulation; spinal block causes redistribution of core heat from the trunk to peripheral tissues which leads to hypothermia and shivering, thermosensitive receptors in spinal cord has been studied, effect of wraming on baricity was studied before; producing less height block.
**Conclusion(s):** Warming heavy bupivacaine 0.5%to body temperature is assiciated with less incidence and inensity of shivering compared to room temperature local anaesthetics
**References:**
1. NSY et al, p.op anesthesia shivering- Natal 2013 no.15
2. Mirzaie et al regional anaesthesia & pain medicine 2008; 241-52
3. Crossly; intensity of shivering

## 04AP04-7

### Learning curves for obstetric spinal anesthesia - preliminary report

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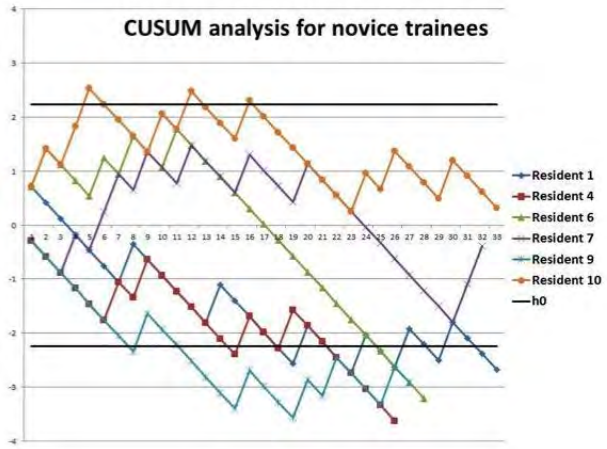
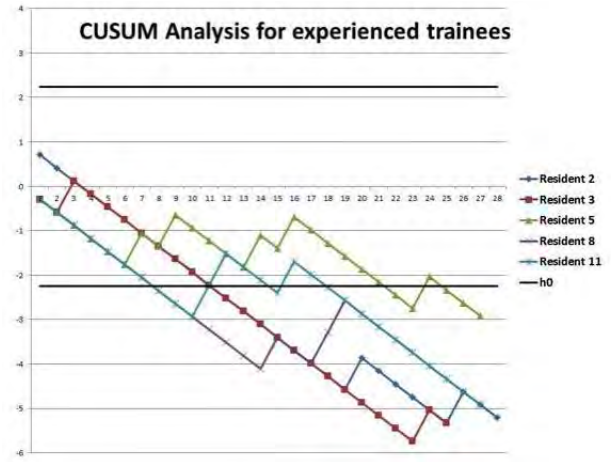
**Background and Goal of Study:** The aim of this prospective study was to compare the effect of residents' experience before obstetric anesthesia rotation (OAR) on their learning curve of obstetric spinal blocks.
**Materials and methods:** Following Ethical Committee approval, residents starting OAR were enrolled. Resident was deemed successful, when he punctured CSF without help within two different interspaces or three needle reinsertions and T4 loss of cold sensation was detected. Residents were classified as novice (1st year; <20 spinal blocks) or experienced (2nd year; 40-50 spinal blocks in their logbooks). The cumulative sum (CUSUM) model was used. At least 24 attempt were needed for cusum analysis with an a and b=0.1, acceptable failure rate (P0)=0.2, unacceptable failure rate (P1)=0.4, upper and lower decision boundaries=2.24. Data are given as percent or median [min-max]. Mann Whitney U and chi-square tests were used.
**Results and discussion:** Results of 312 spinal blocks from 11 residents with at least 25 spinal anesthesia attempts were analyzed. Success rate was 81.6% and 88% in novice and experienced trainees respectively (p=0.16). Resident 7 and 10 from novice group remained inconclusive (after 32 and 33 attempts respectively). Other residents were able to reach acceptable success rate of 80%. Successful novice trainees required 23[12-32] attempts, whereas experienced trainees required 12 [8-22] attempts (p=0.1; Figures 1 and 2).




*[Figure 1]*




*[Figure 2]*

**Conclusion(s):** Although we could not detect a statistical difference in spinal block success between residents with and without previous experience in non-obstetric patients, this study confirms that high attempt number is needed for competency due to wide individual variability[1]. Low number of trainees and targeted success limits our results for a general extrapolation about resident education.

**Reference:**

1. Anesth Analg 2002; 95: 411-6.

## 04AP04-8

### Comparison of two modes of phenylephrine administration for the management of spinal anesthesia-induced hypotension during cesarean section: randomized controlled trial

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**Background and Goal of Study:** In patients receiving spinal anesthesia for elective cesarean delivery, phenylephrine is often used to prevent hypotension that may be source of incompfort for the patient and may be dangerous for the foetus . However the mode of administration is controversial. The objective of our study was to assess the impact of fixed versus variable rate phenylephrine infusion on maternal hemodynamics and fetal pH.

**Materials and methods:** We included 40 women aged from 20 to 40 years, ASA 1 status, scheduled for caesarean section delivery under spinal anesthesia. Patients were randomized into two groups:

- **Group 1:** received a fixed phenylephrine infusion at 50$\mu$g / min.
- **Group 2:** received a titrated phenylephrine infusion according to the variation in the systolic maternal blood pressure.

**Results and discussion:** Demographic data were comparable between the two groups. The maternal systolic blood pressures, heart rates ans fetal parameters were also similar. However, the number of interventions was 5.3 +/- 1.2 in group 2 versus 1.4 +/- 095 in groupe 1; p<0.001. The total dose of phenylephrine needed was 336 ± 120 $\mu$g in group 1 versus 161 ± 49 $\mu$g in group 2, p <0,001.

**Conclusion:** Phenylephrine infusion after spinal anesthesia for cesarean section can prevent maternal hypotension. Titrated infusion may reduce the total dose of phenylephrine consumed but requires more operations to adjust the infusion rate to the maternal blood pressure.

## 04AP04-9

### Intrathecal ropivacaine in cesarean delivery: comparison of three different dosing regimens

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**Background and Goal of Study:** The aim of the present study was to evaluate the optimum dose of ropivacaine by comparing three different dosing regimens of plain ropivacaine 1% (naropin 10 mg/ml, Astra Zeneca) administered intrathecally to subarachnoid space and demonstrated the effects of anesthesia in pregnant women scheduled for cesarean section and effects in newborn.

**Materials and methods:** Sixty ASA grade I-II patients scheduled to undergo elective cesarean sections under spinal anesthesia were included in the study. The patients were randomly assigned into three groups,
Group 1 received 15 mg ropivacaine 1%,
Group 2 received 20 mg ropivacaine 1%, and
Group 3 received 25 mg ropivacaine 1%.
Sensorial block and motor block times and time to reach maximal sensorial block, and motor block time, time to two-segment regression of sensory block. The rates of complications; hypotension, bradycardia, allergic reactions, shivering, nausea and vomiting, time to first analgesic requirement and VAS scores, the umbilical blood gas analysis, and apgar scores of newborn were recorded. One-way analysis of variance (One-way ANOVA) was used to compare variables between the groups, intragroup comparison of the variables was performed by the paired samples t-test, and chi-square test was used to analyze the complications.

**Results and discussion:** In our study intraoperative hemodynamic variables were not significantly different between the three groups, and sensorial block and motor block times and time to reach maximal sensorial block, and motor block time were similar between the three groups. The time to two-segment regression of sensory block was longer in Group 3 compared to other groups, and the difference was statistically significant ($p < 0.05$). Hypotension and ephedrine requirement was significantly higher in Group 3 compared to the other two groups ($p < 0.05$). The time to first analgesic requirement and VAS scores were similar, and there was no significant difference between the groups ($p > 0.05$). The results of umbilical blood gas analysis and Apgar scores were similar between the three groups, and fetal acidosis was not observed (pH <7.20) ($p > 0.05$).

**Conclusion:** We hypothese that although ropivacaine administration produced rapid induction of anesthesia and satisfactory anesthesia level, ropivacaine 15mg and 20 mg dosing regimen is suggested for safe intrathecal administration.

## 04AP04-10

### Relation between fentanyl dose and level of consciousness measured with patient state index during spinal anesthesia for elective cesarean section

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**Background and Goal of Study:** The addition of opioid to a local anesthetic solution for spinal anesthesia is known to exhibit sedative effect. However, this effect has not been adequately studied during cesarean section. It has been reported that PSI value was approximately 80 that was similar to a score of 4 on the Observer's Assessment of Alertness and Sedation system [1].The purpose of the present study was to examine the relationship between fentanyl dose and sedative effect using patient state index (PSI) value.

**Materials and methods:** After IRB approval, 15 patients scheduled to undergo cesarean section with combined spinal and epidural anesthesia were involved. Patients were divided into three groups, with each group receiving a different dose of fentanyl (10 $\mu$g, 15 $\mu$g, and 20 $\mu$g).An epidural catheter was inserted into Th12 / L1. 3 ml of 1% xylocaine was administered as a test drug, without any further drug administration during surgery. Spinal anesthesia with 2.2 ml of hyperbaric bupivacaine combined with the appropriate dose of fentanyl was administered at L3 / 4. Following injection, oxygen (5 L/min) was

administered through a mask. Patients were monitored for Respiratory Rate (RR), $SpO_2$, and PSI values with Root® with SedLine®(Masimo Corp., Irvine CA) .We calculated the average of cumulative time and ratio of the time that had been PSI <90 and PSI <80 from delivery to the end of surgery. RR <8 breaths/min or $SpO_2$ <95% was defined as respiratory depression. Data were analyzed using one-way ANOVA with a significance level set at $p$ <0.05.
**Results and discussion:** There were no significant differences among the three groups in terms of age, height, body weight, ASA classification, surgical time, and block level. Cumulative time and ratio of the time in the three groups for patients with PSI <90 were 2.8 min, 14.4 min, and 36.8 min (p = 0.008) and 6.9%, 30.1%, and 71.0% (p = 0.003), while patients with PSI <80 were 0 min, 4 min, and 14 min (p = 0.272) and 0%, 9.7%, and 24.6% (p = 0.287) respectively. Respiratory depression was not observed in any patient.
**Conclusion:** As increase dose of fentanyl from 10μg to 20μg, the time of PSI<80 was increased. Respiratory depression was not observed in all groups.
**Reference:**
1. Drover et al. Best Practice & Research Clinical Anaesthesiology vol.20, No.1, pp.121-128, 2006

## 04AP04-11

### Impact of maternal age on cesarean delivery rate under epidural labor analgesia

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**Background and Goal of Study:** The number of elderly parturients has been increasing all over the world. It has been proposed that epidural labor analgesia is not related to the increase of cesarean delivery rate, while previous studies showed that advanced maternal age was the independent risk factor for cesarean delivery. The aim of this study is to determine whether the maternal age is related to an increased risk of emergency cesarean rate delivered under epidural labor analgesia.
**Materials and methods:** We performed a retrospective medical record review from 2009 to 2014. Inclusion criteria were women aged from 20 to 49, delivered between 36 and 42 week's gestation, vaginally or by emergency cesarean section under epidural labor analgesia at our institution. Deliveries from women who had contraindications to labor, and deliveries for abortion or fetal death were excluded. Subjects were divided into 3 age groups:
1) less than 35 years,
2) 35-39 years,
3) 40 years and older.
The Chi-square test was used to compare emergency cesarean rate among the 3 groups. We also used multivariable logistic regression analysis to assess the effect of age on outcomes adjusting for induction status, parity, and birth weight.
**Results and discussion:** In the 5 years, total number of deliveries was 8164 and 226 parturients who received epidural labor analgesia were included into the study. In each group, emergency caesarean rate was 13%, 18.9%, 36%, respectively. In total deliveries (n=8164), emergency caesarean delivery rate in 3 age groups was 10, 13 and 20 %, respectively. The parturients delivering with epidural labor analgesia had a higher cesarean rate than those without epidural analgesia. Increasing age is significantly associated with emergency cesarean rate. (p<0.01). In the multivariate model, aged over 40 is a significant predictor of emergency cesarean delivery. (Adjusted odds ratio (95% confidence interval)=3.45(1.41,8.45), p<0.01). The incidence of pregnancy-induced hypertension and gestational diabetes mellitus was not different among 3 age groups.
**Conclusion(s):** Our finding suggests that epidural labor analgesia for women over 40 is independently associated with the increase risk of cesarean delivery compared to parturient under 35.Although a causal relationship should be examined in a more randomized trial, prenatal care providers should discuss the risks and benefits of epidural analgesia for this age.

## 04AP05-1

### Anaesthetic management of labour and delivery in parturients with pulmonary arterial hypertension

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**Background and Goal of Study:** Pulmonary hypertension(PHT) is defined as a mean pulmonary arterial pressure (mPAP)>24mmHg at rest. PHT in pregnancy has varied etiology and carries a high mortality of 17-56%[1]. Available evidence for anaesthetic management of caesarean delivery is based on anecdotal case reports and case reviews only. We aim to present data from our experience for labour and delivery inclusive of instrumental, spontaneous vaginal and caesarean delivery.
**Materials and methods:** We retrospectively audited the charts of all pregnant women who were followed up at two tertiary centres and one District General Hospital from 2002 to 2014. The following data were collected: demographics, gestational age, severity of PHT before and after pregnancy, PHT etiology, treatment, mode of delivery, analgesia and anaesthesia technique, monitoring, foetal and maternal outcomes.
**Results and discussion:** Six parturients with PHT were reviewed. Two had idiopathic PHT, three had congenital heart disease- associated PHT and one had chronic thromboembolic PHT. The mean estimated systolic pulmonary arterial pressure was 87mmHg(72-108). Two deteriorated to (New York Heart Association) NYHA class II from class I. Two had normal vaginal delivery (NVD) and one required forceps. All of these three were managed with a low dose epidural infusion (LDE). The remaining three patients had caesarean section and were managed with perioperative invasive monitoring and low dose sequential combined spinal epidural anaesthesia (LS-CSE). One received postoperative nitric oxide (NO) and vasopressor support. There were no maternal or neonatal deaths at one month.

| Case | NYHA class | Delivery | Analgesia& Anaesthesia | Therapy |
|---|---|---|---|---|
| 1 | I | NVD | LDE | none |
| 2 | I | NVD | LDE | Warfarin,Digoxin |
| 3 | I I | Caesarean | LS-CSE | NO,ionotrope |
| 4 | I | Forceps | LDE | none |
| 5 | I I | Caesarean | LS-CSE | Diltiazem |
| 6 | I | Caesarean | LS-CSE | Aspirin |

*[Table 1:obstetric and peri-operative interventions]*

**Conclusion(s):** Low dose epidural and sequential CSE technique appears to be effective in the management of labour and delivery in parturients with stable mild to moderate pulmonary hypertension. However, further multicentre studies and registries to compare anaesthetic management strategies are required.
**Reference:**
1. Shaun Smith J, Mueller J. Pulmonary arterial hypertension in the setting of pregnancy: A case series and standard treatment approach. *Lung* 2012; 190: 155-60

## 04AP05-2

### General anaesthesia for LSCS in patient with complex congenital heart disease - early multidisciplinary management and a tailored anaesthetic plan

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**Background:** We report a successful elective LSCS with complex congenital cardiac disease with an expected risk of adverse events of 60%.
**Case report:** 28-year-old woman with tricuspid atresia, large ASD/VSD, RV hypoplasia and transposition of great vessels with previous Glenn procedure presented at 17 weeks of pregnancy with worsening dyspnoea. Her Completion Fontan procedure was delayed after discovering a cortical AVM when she had a stroke from infective endocarditis. Serial TTE showed ejection fraction of 40% and severe pulmonary hypertension. Progressive worsening of her symptoms necessitated emergency LSCS at 27 weeks of pregnancy after intensive collaboration with various specialities, aimed at optimising her cardiac function.
Pre-induction, we topicalised her airway with nebulised lignocaine and had invasive lines inserted. RSI was performed using etomidate, ketamine and fentanyl and paralysed with rocuronium at 1mg/kg. Patient was maintained on desflurane at FiO2 1.0. Continuous cardiac monitoring was employed using TOE by the cardiologist. Inhaled nitric oxide was on standby and the ECMO team ready in event of crisis. Following delivery of the baby, oxytocin infusion was started at low dose until adequate uterine tone achieved. Bilateral tubal ligation was performed. At the end of surgery, analgesia was optimised with bilateral TAP block. She was fully reversed with IV sugammadex and extubated before transferred to ICU. Patient was successfully discharged from hospital on POD 10.
**Discussion:** The high risk pregnancy was recognised and managed by multiple disciplines including adult congenital cardiologist at the outset. Multiple meetings were convened. We respected patient's wish to not abort the pregnancy, and balanced early LSCS against optimal fetal growth. Spinal anaesthesia was contraindicated in view of pulmonary hypertension and AVM. GA was preferred over epidural because it would allow TOE and more control over her physiology.
Primarily anaesthetic aim was to minimise abrupt changes to both the SVR and PVR. Gentle induction and ventilation were used to obtund sympathetic discharge and avoid raising SVR hence worsening shunt.
**Conclusion:** Early and meticulous multidisciplinary approach to high risk obstetric case and tailored anaesthetic plan helped to secure a good outcome.
**Reference:**
Siu SC, Sermer M, Colman JM, et al. Prospective multicenter study of pregnancy outcomes in women with heart disease. Circulation 2001;104:515-21

## 04AP05-3

### Eisenmenger's syndrome during pregnancy: anesthetic management of cesarean delivery in 38 patients

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**Background:** Pulmonary arterial hypertension (PAH) associated with congenital heart disease (CHD) usually results from a systemic-to-pulmonary shunt. Eisenmenger's syndrome (ES) is characterized by severe irreversible PAH and reversal of a previous systemic-to-pulmonary shunt [1]. We conducted a retrospective analysis of medical records focusing on anesthetic management of delivery in patients with ES in our hospital.
**Case report:** We analyzed the medical treatment of 36 pregnant women with ES who were followed at our institution over a 5-year period.
**Discussion:** Thirty-eight pregnancies in 36 patients were analyzed. All patients presented with chronic cyanosis and progressive exercise intolerance. Twenty-nine patients had a New York Heart Association heart function classification of III-IV, 20 had different cardiac arrhythmias and 36 underwent cesarean delivery. Six patients died, three of whom had pulmonary hypertensive crisis. Anesthesia management included close arterial blood pressure monitoring, invasive monitoring and vasoactive drugs to maintain stable hemodynamics and avoid a reduction in systemic vascular resistance and an increase in pulmonary vascular resistance, which can lead to sudden profound hypoxemia and death.
**Reference:**
1. Mukhopadhyav P, Bhattacharya P, Begum N. Successful pregnancy outcome with Eisenmenger syndrome. J Obstet Gynaecol India. 2012,62(1):68-69.
**Learning points:** Pregnant women with ES must receive care in a multidisciplinary tertiary care setting. Epidural anesthesia was the preferred method at our institution if there were no contraindications, and it had better clinical outcomes than with general anesthesia. Norepinephrine was the first choice for vasoactive drugs to maintain systemic and pulmonary vascular resistance.

## 04AP05-4

### Severe preeclampsia and peripartum cardiomyopathy following in vitro fertilization

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**Background:** Peripartum cardiomyopathy is a cardiac insufficiency in healthy women in the final month of pregnancy and up to 5 months after delivery. A possible mechanism is an abnormal immune response to pregnancy (1). Reproductive assisted techniques may increase the risk of pregnancy disturbances (2).
**Case report:** A 40-years-old woman, multigravida (4$^{th}$ pregnancy), with mild preeclampsia, is admitted for induction of labour of a term twin pregnancy (in vitro fertilization with ovodonation). A normal vaginal delivery was performed under epidural anaesthesia.
After delivery, she complained of diplopia with anisocoria. She developed an acute respiratory insufficiency, requiring immediate orotracheal intubation. The angio CT Scan showed an acute pulmonary edema without pulmonary embolism nor intracranial pathology. A severe left ventricular insufficiency was elicited (FEVI of 25%, global hypoquinesia; minimum pericardial effusion; inferior cava vein dilation).
Ten hours after delivery she developed a HELLP syndrome. She was treated with Magnesium Sulfate, Furosemide, Eplerenone, Lisinopril and Beta Blockers. Fifteen days after delivery, the patient normalized systolic function and radiological image. She had a favorable outcome and was discharged 3 weeks later.
**Discussion:** This case combines two pathologies: peripartum cardiomyopathy and HELLP syndrome. The patient was primarily affected by a peripartum cardiomyopathy and afterwards developed the HELLP Syndrome. Severe preeclampsia can be associated with severe ventricular dysfunction and many cases have already been reported. Meanwhile peripartum cardiomyopathy is less common. Outcome can be fatal in both cases.
**References:**
1. Johnson-Coyle L, Jensen L, Sobey A. *Peripartum Cardiomyopathy Review and Practice Guidelines.* American Journal of Critical Care 2012, 21(2):89-982
2. van der Hoorn M-L, Helmerhorst F, Claas F, Scherjon S, Lashley L. *Preeclampsia in non donor IVF and egg donation pregnancy: is there a different pathophysiology?* Fertility and Sterility 2011, 95(2): 805e 1-3
**Learning points:**
- In vitro fertilization and ovodonation increases the risk of peripartum complications.
- A normal delivery doesn't exclude a complication with fatal outcome.
- Think of peripartum cardiomyopathy in unexplained heart failure in late pregnancy or early puerperium.
- Acute changes in clinical status may appear very rapidly.
- Early diagnosis and team collaboration is fundamental.

## 04AP05-5

### Spinal anaesthesia in the obstetric patient with Brugada syndrome: a report of two cases

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**Background:** Brugada syndrome is a genetic disorder that may cause syncope or sudden death in patients with a structurally normal heart. The disorder results in a loss of function of cardiac sodium channels. As local anaesthetics interact with sodium channels, they are relatively contraindicated in patients with Brugada syndrome.

**Two Cases:** Two obstetric patients, who had been diagnosed with Brugada syndrome prior to hospitalisation, were given spinal anaesthesia.
Patient 1 needed pain relief after induction of labour at a gestational age of 41 weeks. A spinal catheter was placed and she received an initial dose of 5mg ropivacaine. Then, a continuous spinal infusion of ropivacaine 1.7 mg/ml and sufentanil 0.8$\mu$g/ml was started at 2ml/hour. An additional dose of 1ml of the mixture was given, when breakthrough pain occurred at 9cm dilatation. There was an adequate level of analgesia with minimal motor impairment. No adverse ECG changes were observed. Afterwards there was the need to perform an autologous blood patch, because of post-dural puncture headache (PDPH).
Patient 2 needed anaesthesia to undergo a curettage after an induced abortion at a gestational age of 8 weeks. The anaesthesiologist chose to use spinal anaesthesia. The anaesthesia was performed using a total amount of 50 mg hyperbaric prilocaine. Rescue analgesia was needed and 750 $\mu$g alfentanil was given during the surgery. No adverse ECG changes were observed.
**Discussion:** Brugada syndrome is caused by defective sodium channels, as a result of a genetic mutation. As local anaesthetics interact with sodium channels in the heart, the use of local anaesthetics is controversial in patients with Brugada syndrome. It is recommended to avoid large doses and to use short-acting products. Spinal anaesthesia reduces the amount of local anaesthetic needed. Continuous spinal anaesthesia is a useful technique with a lot of advantages, but with a high risk of PDPH. Both patients received spinal anaesthesia with local anaesthetics. No events or ECG changes were observed.
**Learning points:** Spinal anaesthesia, using short-acting local anaesthetics, may be considered in obstetric patients with Brugada syndrome.

## 04AP05-6

### Cardiorespiratory arrest during obstetric anesthesia. A 10-year analysis in Vall d'Hebron Hospital, Barcelona

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**Background and Goal of Study:** Cardiorespiratory arrest in the obstetric population is a rare but catastrophic event. Obstetric care teams have a low exposition to this kind of critical situations, so it's necessary to maintain a constant training, the study of its causes and the appropriate treatment in this group of patients.
**Materials and methods:** Retrospective study. Anesthetic procedures during 2.005 and 2.014 were analyzed. The main objective was to determine the incidence of cardiac arrest during the anesthetic assistance during labor and caesarean sections. Secondary objectives were: to determine survival tax after hospital discharge, functional prognosis after hospital discharge according to the OPC (Outcome Performance Cerebral) scale of Pittsburg-Glasgow, the etiology and the kind of anesthesia performed.
**Results and discussion:** 36.672 anesthetic procedures were analyzed. There were 4 cases of cardiac arrest, all of them during caesarean section procedures. The initial anesthetic technique was locoregional in the 50% of patients. We found an incidence of one case each 9.168 anesthetic procedures, 1/2.567 caesarean sections. Survival tax after hospital discharge was 75%. Functional prognosis of the survivors was good in all of patients (OPC 1, 2 patients and OPC 2, 1 patient). Only one case was directly related to anesthetic procedure. The causes of the cardiac arrest were: 1 case related to problems in the airway management, 1 case due to amniotic fluid embolism, 1 case related to previous cardiopathy and severe preeclampsia and the last case due to massive hemorrhage. In all of the cases a live fetus was obtained.
**Conclusion(s):** Cardiac arrest is an infrequent event during obstetric anesthesia, which requires an adequate coordination between specialties. In our study we found an incidence of 1/9.000 obstetric anesthetic procedures related to hemorrhage, problems during the airway management and cardiomiopathy.

## 04AP05-7

### Pregnancy and HELLP syndrome (HELLPS) in patients with Eisenmenger's syndrome (ES): anesthetic management of cesarean delivery in 4 patients

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**Background:** Pregnancy and HELLPS in patients with ES are extremely rare. We reported 4 such cases and described the medical records focusing on anesthetic management of delivery in our hospital.
**Case report:**
Case 1: Medical data: age32, 33gestational weeks, BP181/120mmHg, PAP172/101mmHg, HR85 bpm, EF55%, $SpO_2$74%, $PO_2$53mmHg. Laboratory parameters: Hct52.3%, PLT52.4×$10^9$. Anesthesia method: general anesthesia(GA). Outcomes*:* died at 17 days postpartum.
Case 2: age20, 34weeks, BP172/110, PAP170/113, HR82, EF61, $SpO_2$61, $PO_2$41. Hct37.2, PLT65×$10^9$. Anesthesia method: GA. Outcomes*:* died at 32 hours postpartum.
Case 3: age30, 34weeks, BP147/90, PAP137/74, HR78 , EF51, $SpO_2$51, $PO_2$37.5. Hct46.3, PLT74×$10^9$. Anesthesia method: epidural anesthesia(EP). Outcomes*:* discharged at 9 days postpartum.
Case 4: age32, 33weeks, BP177/90, PAP171/69, HR102, EF45, $SpO_2$85, $PO_2$47. Hct48.4, PLT63×$10^9$. Anesthesia method: EP. Outcomes*:* discharged at 10 days postpartum.
**Discussion:** Termination of pregnancy is necessary within 48 hours of stabilization of the maternal condition using a multidisciplinary approach, irrespective of the weeks of gestation. In pregnant patients with HELLPS, especially if the platelet count is less than 50×$10^9$/L, GA is the usual method of choice for the preferred CS. But in pregnant patients with HELLPS and ES, EP needs to be considered after effective platelet transfusions.Anesthesia management included close arterial blood pressure monitoring, invasive monitoring and vasoactive drugs to maintain stable hemodynamics and avoid a reduction in systemic vascular resistance and an increase in pulmonary vascular resistance. Antihypertensive medication results in a fall in systemic vascular resistance, patients with ES may have augmentation of the right-to-left shunting. Such patients are not recommended for antihypertensive therapy. Effective sedation can be beneficial for hemodynamic stabilization.
**References:** [1] Bedard E, Dimopoulos K, Gatzoulis MA. Has there been any progress made on pregnancy outcomes among women with pulmonary arterial hypertension? Eur Heart J 2009;30:256-65.
**Learning points:** Pregnancy with HELLPS and ES must receive care in a multidisciplinary tertiary care setting. EP was the preferred method at our institution after effective platelet transfusions, and it had better clinical outcomes than with GA. Norepinephrine was the first choice for vasoactive drugs to maintain systemic and pulmonary vascular resistance.

## 04AP05-8

### Anaesthetic techniques for caesarean section in severe preeclampsia: prospective observational study in a level III University Hospital

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**Background and Goal of Study:** Neuraxial anaesthesia is the preferred anaesthetic technique for delivery by caesarean section (CS) in severe preeclampsia (SP)[1]. General anaesthesia (GA) should be avoided, as intubation and extubation maneuvers produce a great hypertensive response, which increases the risk of maternal cerebral haemorrhage and death. The goal of study was to analyze the anaesthetic techniques used in CS in SP.
**Materials and methods:** After obtaining approval from the Institutional Ethics Committee (code PI-901), we performed a prospective observational study of patients with SP admitted to the Obstetric Intensive Care Unit of a level III University Hospital between 2010 and 2012. Severity diagnostic criteria were: systolic pressure ≥160 mm Hg, dyastolic pressure ≥110 mm Hg, 24 hours proteinuria ≥ 3g, headache, epigastric pain, visual disturbances, right upper quadrant pain, oliguria, serum creatinine >1.2 mg/dl, thrombocytopenia <100,000/$\mu$l, serum AST or ALT ≥70 IU/l, HELLP syndrome, pulmonary oedema, eclampsia, intrauterine growth restriction and oligoamnios.

Mode of delivery was studied and, in patients who delivered by CS, anesthetic techniques and causes of GA were analyzed.
Comparisons between qualitative variables were investigated using the Fisher's Exact Test and the Chi-square test.
**Results and discussion:** 276 cases of SP were analyzed. 90.5% (n=249) of patients gave birth by CS.
Anesthetic techniques used in CS were: combined spinal-epidural 43.4% (n=108), epidural 30.9% (n=77), general 19.3% (n=48) and spinal anaesthesia 6.4% (n=16).
The causes of GA were: immediate threat to the life of the foetus (54.2%, n=26), ineffective regional anesthesia (22.9%, n=11) and contraindication for neuraxial anesthesia (14.6%, n=7).
GA was more frecuent in case of *"placental abruption"* (adjusted OR 40.11, 95% CI 8.2-195.9), thrombocytopenia (adjusted OR 3.39, 95% CI 0.9-11.8) or systolic pressure ≥180 mm Hg (adjusted OR 2.65, 95% CI 1.2-5.7), and less in multiple pregnancies (adjusted OR 0.16, 95% CI 0.02-1.2).
It is important to consider the early insertion of an epidural catheter in selected cases of SP, as well as a close follow up of it during labor, in order to reduce the rate of GA owed to contraindication or failure of neuraxial techniques.
**Conclusion:** The analysis of anaesthetic techniques for CS in SP might improve the prognosis of the disease.
**Reference:**
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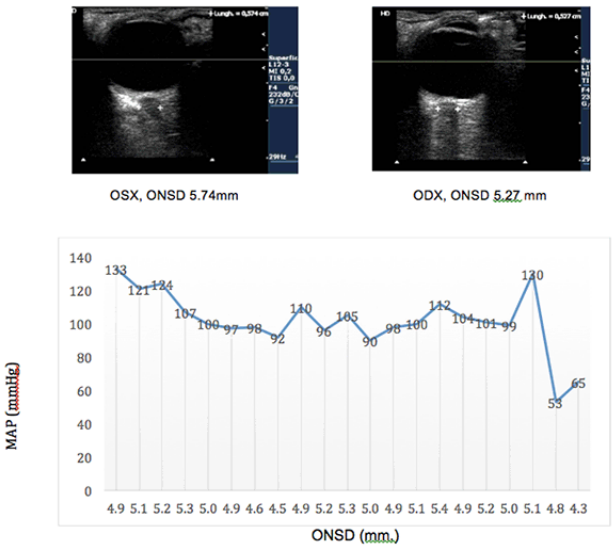


*[Figure 1. Correlation between optic nerve sheath diameter (ONSD) and Mean Arterial Pressure (MAP) with ultrasound example of ONSD (OSX/OSD) measurements]*

## 04AP05-9

### The evaluation of ultrasound optic nerve sheath diameter as a sign of intracranial hypertension during preeclampsia

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**Background and Goal of Study:** Preeclampsia is a condition during pregnancy where there is a sudden rise in blood pressure, swellingin the face, hands and feet and albuminuria. In these patients an increased intracranial pressure has been observed. The optic nerve sheath is an anatomical extension of the duramater so any pressure rise within the intracranial compartment impacts on the optic nerve. Dilatation of the optic nerve sheath has been shown to be an earlier manifestation of intracranial pressure rise.
The goal of our study is to compare the optic nerve sheath diameter (ONSD) measured by transorbital ultrasound in pregnant women affected by preeclampsia.
**Materials and methods:** A systematic multicentric review of our recorded data was analyzed. Twenty-one pregnant women affected by preeclampsia were observed for measurement of ONSD before spinal anesthesia for cesarean delivery. The ONSD was assessed 3 mm behind the globe (Figures 1,2). A value <4.8 mm was considered normal and used as the cut-off value. The examination was performed for both eyes with the patient in the supine position and the head elevated 20°-30° to the horizontal. Mean arterial pressure (MAP) and ONSD were also releted. The ultrasound 5-10 MHz probe was placed on the lateral aspect of the closed upper eyelid and angled medially and caudally until the hypoechoic optic nerve could be clearly showed.
**Results and discussion:** Ultrasound measurements >4.8 mm were observed in 17 patients (80,95%) and ≤4.8 mm in 4 patients (19.04%).
In all 17 patients the ONSD for both eyes was higher with statistical significance (p <0.05). Sensitivity of 50% (95% CI 27.9%-74.3%) and specificity of 90,2% (95% CI 81,6.5%-96.5.%) were achieved. 32% in the right eye and 37% in the left eye had a diameter of optic nerve sheath >5.0 mm. A correlation between MAP and ONSD was found as described (Figure 1).
**Conclusions:** Ultrasound optic nerve sheath measurement in patients with preeclampsia was an high predictive value as a sign of intracranial hypertension. Moreover it's a non-invasive tool for the evaluation and care in obstetric anestshesia for high risk patients >4.8

## 04AP05-11

### Audit of obstetric intensive care unit stay in patients with severe preeclampsia

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**Background and Goal of Study:** Hypertensive disorders of pregnancy (HDP) are the first obstetric cause of admission in the intensive care units (ICU). Approximately 0.3-0.4% of patients with severe preeclampsia (SP) require ICU admission, with a median of stay from 3 to 6 days[1]. The aims were to study the causes of long stay (LS) in the Obstetric ICU in patients with SP and to evaluate maternal satisfaction during admission in it.
**Materials and methods:** After Local Ethics Committee approval, a prospective observational study of all patients with SP admitted to the Obstetric ICU in a level III University Hospital, from 2010 to 2012, was performed.
Severity was defined as: 24 hours proteinuria ≥ 3g and according to current criteria[2]. LS was established as ≥ 36 hours.
60 days after discharge, we made a telephone survey, in which aspects related to the maternal stay in the Obstetric ICU were evaluated (scale of 1 to 10): information given to the patient and her family, subjective feel of full recovery and nurse staffing evaluation. A score ≥7 was considered favorable. Pain during artery catheterization was analyzed, considering it moderate if EVA ≥ 4.
**Results and discussion:** The incidence of admission was 1.4% (n=276 patients, 19,280 deliveries). Median stay was 24 hours (IQR 14-42 h).
LS incidence was 34.4% (n=95). It's main causes were: refractory hypertension (67.3%, n=4), obstetric hemorrhage (OH) (9.5%, n=9) and HELLP syndrome (8.4%, n=8). The factors associated with LS were: African or Asian population (adjusted OR 5.96, 95% CI 1.2-30.9), early-onset (<34 weeks) disease (adjusted OR 2.4, 95% CI 1.6-4.5), OH with transfusion (adjusted OR 14.4, 95% CI 4.7-43.7) and pulmonary oedema (adjusted OR 6.7, 95% CI 1.5-29.6).
41% (n = 105) and 23.3% (n = 60) of women assessed negatively the information provided to them and to their relatives, respectively. The subjective feel of full recovery and nurse staffing evaluation was positive in 92.3% (n = 241) and 93.9% (n=245) of cases, respectively. Pain during artery catheterization was moderate in 54.9% (n=39).
**Conclusion(s):** One in three patients had a LS, mainly owed to refractory hypertension. The information provided about the disease was the main aspect to improve.
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## 04AP05-12

### Levosimendan for the treatment of a woman with severe pre-eclampsia and eclampsia: a case report

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**Background:** Pre-eclampsia (PE) and eclampsia are important direct causes of morbi-mortality in pregnancy. Beside derangement of blood pressure (BP), recent studies claim a role for cardiac function: PE and peripartum cardiomyopathy might represent two faces of a coin. We show as levosimendan can be employed in a case of PE.
**Case report:** A 29-year-old woman in week 39 of pregnancy, previously healthy, developed hypertension with epigastric pain, headache, photopsia, and edemas; she was admitted in the ICU because of severe hypertension (230/130 mmHg).
At admission (T1) blood analysis showed as Table 1. Right after, the woman presented seizures; uterine hypertonia was also noticed which indicated an emergent caesarean section that was performed under general anesthesia with rapid induction sequence and ASA standard monitoring. A female newborn (1875 g, APGAR 8/8) was delivered. Back to ICU, a transthoracic echocardiography was performed, showing: mild left ventricular hypertrophy, LVEF 46% and global hypokinesia. At this point, five drugs (labetalol, magnesium sulfate, captopril, furosemide and nitroglycerin) were needed to maintain the patient stable.
On the first post-delivery day (T2), the patient continued oliguric and minimal invasive hemodynamic monitoring (FloTrac$^{å}$, Edwards) was started: CI 2.8 L/min/m$^2$; SVI 40 mL/m$^2$; SVRI 2500 dynes-sec/cm$^{-5}$/m$^2$. These findings were coherent with the US evaluation and suggested low tissue perfusion. We considered levosimendan infusion, and volume expansion using human albumin 20%.
After 2 hours, effects were patent: while BP didn't change, hemodynamic monitoring showed an important increase in CI (4.0 L/min/m$^2$) and SVI (50 mL/m$^2$). Levosimendan infusion lasted 24 hours. FloTrac data maintained unchanged for 48 hours, when it was discontinued. At this point (T3) blood analysis showed as Table 1. At discharge, treatment consisted in oral antihypertensive.
**Discussion:** Diastolic and systolic dysfunction should be considered in women with PE. Use of vasolidators alone could not be sufficient when facing low CI and organs' hypoperfusion.
This case shows how inotropic treatment in PE improved clinical conditions and outcomes.

| | T1 | T2 | T3 |
|---|---|---|---|
| Hemaglobin (g/dL) | 12.1 | 8.9 | 8 |
| Platelets | 198.000 | 187.000 | 230.000 |
| Bilirubin | 1.2 | 0.9 | 0.4 |
| AST | 96 | 100 | 33 |
| ALT | 142 | 74 | 34 |
| LDH | 286 | 230 | 170 |
| NT-ProBNP | | 7307 | 1595 |
| pH | 7.32 | 7.34 | 7.43 |
| Lactate | 6.8 | 1.5 | 0.7 |
| Creatinine | 2.2 | 1.1 | 0.6 |
| Creatinine Clearance | | 64.8 | 127 |

*[Table 1]*

## 04AP06-1

### The effect of epidural blood patch on auditory function after accidental dural puncture. A prospective controlled study in the parturient

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**Introduction:** Accidental dural puncture (ADP) affects 1% of parturients having epidural analgesia. Hearing loss following PDPH is not uncommon. The primary aim of this study was to investigate auditory function following accidental dural puncture (ADP) in parturients.
**Material and methods:** Twenty-one parturients with PDPH were included (Group: PDPH). An equal number of parturients with epidural (Group: +EDA) or without epidural (Group: -EDA) served as controls.
A battery of audiometric tests was performed at defined times, with a follow-up after 3 months. Associated symptoms, pain intensity and complications were recorded.
**Results:** A significant difference in the number of parturients with clinically important hearing loss (> 20 dB) was found at 0.25 kHz in the left ear between group PDPH (43%) and group -EDA (4.8%) ($p = 0.009$) and in the right ear between group PDPH (24%) and group -EDA (0%) ($p=0.048$). Audiometric hearing loss did not improve 4 h after the application of EBP. Intensity of headache was significantly lower in the sitting position four hours after treatment with EBP ($p<0.05$). However, 24% patients had numeric rating pain score (NRS) >3 at 24 h and 19% at 48h.
**Conclusions:** A significantly greater number of parturients with PDPH had clinically important hearing loss > 20 dB at low frequencies compared to controls without epidurals. EBP did not reverse this hearing loss. EBP resulted in a significant reduction of PDPH after 4 h but partial failure was seen in one of four parturients at 24 h.

## 04AP06-2

### Predictive factors associated with postoperative paralysis of foot after caesarean section under combined spinal-epidural anaesthesia: a retrospective study

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**Background:** Paralysis of foot is one of the complication after combined spinal-epidural anaesthesia (CSEA). Incidence of this complication was reported about up to 20% after caesarean section (C/S). However, there were no study about predictors of these problems.
We performed a multivariate logistic regression on pregnant woman with C/S to evaluate the relationship between predictors and paralysis of foot after C/S under CSEA.
**Methods:** Data were obtained retrospectively from the medical and anaesthetic records of 291 pregnant woman with C/S under CSEA between January 1, 2011 and December 31, 2012 at Itabashi Chuo Medical Center. Paralysis of foot was defined as patients could not walk or bend theirs knee more than 90 degrees within 48 hours after C/S. Logistic regression was used to examine associations between the independent variable (i.e. paralyze or numbness of foot) and 14 parameters including patients, anaesthesia, and operative factors. A forward stepwise procedure was used to select the final regression model, which was determined by selecting the model with the lowest Akaike's information criterion value for each step.
**Results:** The incidence of paralysis of foot was 29.6% (86 of 291 patients). Multiple regression analysis revealed that gestation age, pregnancy induced hypertension, drug type of spinal anaesthesia, site and methods (median or paramedian) of epidural catheter insertion were associated with the incidence of paralysis of foot. Out of these, site of epidural catheter insertion (-0.0712 [95% confidence interval {CI}, -0.121 - -0.0218]) and paramedian method (0.230 [95%CI, 0.988 - 0.361]) were identified as strong predictors.

**Conclusion:** This study revealed that paralysis of foot after C/S under CSEA was affected by gestation age, pregnancy induced hypertension, drug type of spinal anaesthesia, site and methods of epidural catheter insertion.

## 04AP06-3

### A case of posterior reversible encephalopathy syndrome (PRES) with total loss of vision during an elective LSCS

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**Background:** Posterior reversible encephalopathy syndrome (PRES) is a constellation of neurological symptoms and radiological abnormalities consisting of headaches, altered mental status, visual disturbances/blindness and seizures.[1] It is often associated with an abrupt increase in BP, although the aetiology is diverse.[1,2]
**Case report:** A 42-year old lady, G3P2, 39/40, with a background history of classical migraine with visual aura, presented for an elective LSCS. Three weeks prior to presentation, she had been observed for borderline hypertension without proteinuria but was not on medications. She underwent an uneventful spinal anaesthetic, but soon after, required phenylephrine boli for hypotensive episodes. She experienced an exaggerated response to standard dose phenylephrine and her BP reached 215/110 from a low 70/40. A healthy but small for dates baby was delivered, but soon after, the mother complained of severe headache with total loss of bilateral vision. Her fundi were normal on ophthalmoscopy and she had no other neurological deficit. She was treated with labetolol and magnesium infusion. Urgent MRI showed hyperintense signals in both occipital lobes on diffusion and FLAIR sequences. Clinical improvement with complete resolution of symptoms was observed within 7 hours. Follow up MRI 2 weeks later showed complete resolution of previously noted abnormal signals.
**Discussion:** As per the revised criteria by the ACOG in 2013, preeclampsia refers to the new onset of hypertension and either proteinuria or end-organ dysfunction after 20 weeks of gestation in a previously normotensive woman. [3] Although our patients had borderline hypertension but no criteria for preeclampsia, her clinical course was highly suggestive of preeclampsia.
**References:**
1. Bartynski WX (2008) Posterior reversible encephalopathy syndrome, part 1: fundamental imaging and clinical features. AJNR AM J Neuroradiol: 1036-1042
2. Hagemann G, Ugur T, Witte OW, Fitzek C. Recurrent posterior reversible encephalopathy syndrome (PRES). J Hum Hypertens. 2004 Apr; 18(4): 287-9
**Learning points:** This case demonstrates that awareness of PRES is important for the anaesthetist and also highlights the potential reversibility of this condition. Cerebral MRI is the key investigation for diagnosis of PRES. Rapid recognition and institution of treatment is essential to avoid complications, which can lead to permanent disability or even death.

## 04AP06-4

### Insertion of intrathecal catheter after accidental dural puncture reduces the likelihood of autologous epidural blood patch

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**Background:** Accidental dural puncture (ADP) is a complication of epidural insertion during labour[1]. A high proportion of these patients will go on to develop post-dural puncture headache (PDPH) which is associated with significant morbidity[2]. Management of ADP may involve the insertion of an epidural catheter through the dural tear and provision of labour analgesia with intermittent boluses. Autologous epidural blood patch (AEBP) is the gold standard treatment but is associated with significant risks not least further ADP. There is some evidence that insertion of an intrathecal catheter (ITC) for 24 hours after ADP reduces the incidence of AEBP[3]. However evidence as to the benefit of ITCs is conflicting[4]. The aim of this study was to determine if insertion of an ITC in recognised ADP reduced the need for AEBP.
**Materials and methods:** We audited departmental practice using our obstetric database to determine the number of ADPs occurring over a 30 month period. All patients in whom ADP was recognised on insertion of the Tuohy needle were identified. The subsequent rate of AEBP in patients who received an ITC was compared with those who did not.
**Results and discussion:** A total of 3,271 epidurals were sited between 01/01/12 and 12/6/2015
Total no. of dural punctures recognised by CSF from the Tuohy needle = 44
Total no. of ITCs inserted = 20
No. ITCs that received AEBP = 4 (20%)
No. of non-ITC that received AEBP = 10 (41.67%)
ITCs remained in situ for at least 24 hours. No adverse incidences were reported with regard to their use.
**Discussion:** Although the data set is small, making statistical analysis difficult, the data concurs with other larger studies suggesting that insertion of an ITC after ADP reduces the incidence of AEBP[3]. PDPH can prolong hospital stay for both mother and child and consequently contribute to an increase in the cost of health care in the maternity ward. In addition, AEBP has risks to the mother as well as resource implications for the hospital. It would seem prudent to take steps to avoid its occurrence.
**Conclusion:** Although a larger study is warranted we recommend after witnessed ADP that an ITC is inserted to reduce the need for AEBP. A robust governance framework should exist to ensure the safe use of ITCs.
**References:**
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## 04AP06-5

### Obstetric risk factors for unintended dural puncture and subsequent labor outcome

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**Background and Goal of Study:** Unintended dural puncture (UDP) is one of the main risks of epidural analgesia, with a reported incidence among the obstetric population approximately 1.5% (1). UDP is associated with many maternal adverse outcomes with the most frequent adverse outcome being postdural puncture headache (PDPH) (2,3). Our study objective was to identify demographic and obstetric risk factors that increase the risk of dural puncture as well as describing the obstetric outcome once a dural puncture has occurred.
**Materials and methods:** We retrospectively reviewed all cases of UDPs during vaginal delivery between the years 2004-2013. Data analysis included anesthetic, demographic and obstetrical characteristics of each UDP case. Each UDP was matched with the two epidurals before and two after that were performed by the same anesthesiologist.
**Results and discussion:** Out of 46,668 epidurals 177 cases of UDPs were recognized, representing 0.4%. One hundred and seven women (60.5%) developed PDPH. Of those women, 38 (35.5%) required a blood patch. Parturients with UDP were more commonly in active phase of labor ($p=0.007$), had a significantly higher median cervical dilatation at the time of epidural insertion ($p<0.001$) and a lower rate of premature rupture of the membranes ($p=0.04$). Women with UDP had lower VAS scores 30 minutes post insertion compared to women with regular epidurals ($p=0.001$). There were no significant differences in duration of labor, rates of operative vaginal or cesarean deliveries; however, women with UDP had longer hospitalization times ($p<0.0001$).
**Conclusions:** Women at higher cervical dilatation are at higher risk for dural puncture. UDP was associated with prolonged hospital stay and high rate of PDPH.
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## 04AP06-6

### Persistent headache and backache following accidental dural puncture in the parturient

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**Introduction:** Post dural puncture headache (PDPH) is the commonest complication of labor epidural analgesia (EDA). The primary aim of this study was to investigate the incidence and severity of headache and backache several years after an accidental dural puncture (ADP) and treated with an epidural blood patch (EBP), compared to two control groups without ADP.
**Material and methods:** The study was performed in parturients having had an ADP treated with EBP during the time period 2005 - 2011. Group EBP consisted of 56 parturient who were previously treated with EBP following PDPH caused by 18 gauge (G) Tuohy needle.
Two groups with EDA (group +EDA) (n=160) and without EDA (group -EDA) (n=119) and matched for age and the year of delivery served as controls. A modified version of Brief Pain Inventory (BPI) was used to determine headache and backache during the previous three months.
Results were analyzed for the total group as well as for those patients having postpartum (not pre-pregnancy) headache or backache.
**Results:** The study was performed 5.2 (1.9) years (mean, SD) after treatment with EBP. The incidence of headache (NRS $\geq$ 4) in the previous 3 months was 55%, 42% and 39% in Groups EBP, +EDA and -EDA ($p = 0.02$, EBP vs. -EDA) respectively. Significantly greater headache was also found in Group EBP compared to Group -EDA for pain severity ($p = 0.015$), pain interference ($p = 0.009$) and total pain experience ($p = 0.006$) as assessed by BPI. The incidence of backache (NRS $\geq$ 4) varied from 28-38% without any significant differences between the groups.
**Conclusion:** A high incidence of both headache and backache was found in our study in all subjects several years following delivery. Subjects who had an accidental dural puncture treated with an epidural blood patch had a higher incidence and severity of headache, but not backache.

## 04AP06-7

### Pneumocephalus post epidural blood patch in postpartum lady

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**Background:** 28 year old female pregnant lady underwent epidural analgesia for labor pain, at third day presented with postdural puncture headache, sixth day post epidural under-went epidural blood patch treatment complicated with pneumocephalus showed by brain and spine MRI.
**Case report:** 28 year old pregnant lady Gravida1 Para 0, previously healthy at 38 weeks gestation was in labor. She was desired to have lumbar epidural for labor analgesia. Next day she was discharged home. Later on, she complained of severe frontal headache associated with dizziness. She was admitted for blood transfusion and for brain MRI/MRA/MRV which showed no subarachnoid hemorrhage, no space occupying lesion, no midline shift. She was admitted for epidural blood patch treatment. Another brain, spine C.T scan was done found to have pneumocephalus (air bubbles) intraventricular, no hydrocephalus, no midline shift with hypodensity in the saggital sinus . Neurosurgical consultation was asked, bed rest, starting dexamethason, no oxygen therapy and no surgical interventions in the meanwhile.
Next day, her headache started to improve and she was discharged home after two days.
**Discussion:** There are already in the literature reports of complications during air injection in the epidural space, including: nervous roots and spinal cord compression, retroperitoneal gas collection, subcutaneous emphysema, airway embolism, incomplete analgesia, paresthesia and pneumocephalus (7). Pneumocephalus is a relatively frequent complication in neurosurgery and/or neuroradiology (8,9) and may be also caused by trauma and infection (10,11). Although relatively rare, it may occur during epidural puncture.
**References:**
7. Saberski LR-Identification of the epidural space: is loss of resistance to air a safe technique?Reg Anesth, 1997;22:3-15.
8. Reasoner DK-The incidence of pneumocephalus after supratentorial craniotomy. Anesthesiology, 1994;80:1008-1012.
9. Heinz ER - Techniques in Imaging of the Spine: Myelography, The Clinical Neurosciences:
**Learning points:** Such complication could be avoided if in punctures following dural puncture we had used saline. This case confirms the possibility of iatrogenic pneumocephalus during epidural block with the loss of resistance to air technique for epidural space identification. Faced to signs and symptoms of meningeal irritation, CT/MRI is the diagnostic tool recommended for the differential diagnosis of pneumocephalus.

## 04AP06-8

### Cerebrospinal fluid-cutaneous fistula after lumbar epidural for labour analgesia - a case report

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**Background:** Epidural analgesia is now the mainstay for controlling labour pain in appropriate patients, but it entails some risks. The development of a cerebrospinal fluid-cutaneous fistula is one such complication, insufficiently divulged among anaesthesiologists.
**Case report:** 25 year old, 40 weeks 3 days pregnant ASA I patient, presenting to the hospital in labour. A lumbar epidural was sited at the L3-L4 level using the loss-of-resistance technique with saline. A test dose of 3cc levobupivacaine 0,2% was administered and 5 minutes later a further 3cc, with the patient developing a patchy sensory block up to T8 and motor block, leading to removal of the catheter and placement of a new one at the L4-L5 level. 4 hours later, the previously placed epidural catheter was used for the first time, but showed to be ineffective relieving pain, leading a different, seasoned anaesthesiologist to place a new one at the L3-L4 level.
However, it proved to be intrathecal and a new approach to the L2-L3 space was made. Several top ups were performed through this catheter in the following 13,5 hours, with it ultimately being used for anaesthesia as the patient was submitted to caesarean section. 24 hours later the patient evidenced complaints suggestive of postdural puncture headache, which did not significantly improve with conservative measures and it became apparent that clear fluid oozed through the insertion site in the following 24h.
A fast glucose determination was made, evidencing a value of 92mg/dL, and Neurosurgery consultation requested. A cerebrospinal fluid-cutaneous fistula was assumed on clinical grounds (no MRI available) and indication for a blood patch decided by neurosurgery, which was performed at the L4-L5 interspace with administration of 17 cc of autologous blood. The complaints immediately subsided, and the patient was discharged home 3 days later.
**Discussion:** CSF-cutaneous fistulas have been described as a complication of epidural placement, usually presenting in the first 24h after catheter removal. They appear to be more frequent after multiple attempts at epidural placement, and constitute a risk factor for meningitis development. Prompt assessment and treatment is therefore of utmost importance.
**Learning points:** While epidural analgesia is advantageous, it should be faced with caution as the potential for severe complications is real and should be weighed in the decision making process.

## 04AP06-9

### Postspinal backache in parturients receiving spinal anaesthesia for Cesarean sections: an observational study

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**Background and Goal of Study:** To evaluate the coincidence between postspinal backache (PSB) and multiple attempts of needle insertion in parturients undergoing caesarean section under spinal anesthesia, using the same type and size of spinal needle (22G Quinke needle) through a midline approach.
**Materials and methods:** After the approval of our inistitutional review board 853 patients scheduled for elective caesarean section, with no contraindication to spinal anesthesia, were included in this prospective single-blinded observational study. In the sitting position spinal anesthesia was performed, the number of attempts and punctures till the success of the block as well as the incidence of touching the bone and its number, were all recorded. The patients were followed up in the ward and by a telephone call by another anaesthetist, blind to the patient and the procedure, at the day of the operation (0), postoperative days (1), (2) and (3). Degree of back pain was evaluated using visual analogue scale (VAS)
**Results and discussion:** 483 patients were successfully given spinal anesthesia after a single attempt and via one puncture, *group (S),* while in 370 patients spinal anesthesia was successfully carried out after multiple attempts and multiple punctures [ranging from 2-5 attempts (punctures)], *group (M)*. Age and BMI were statistically significant higher in the multiple attempt group (M) compared to the single attempt group (S), The number of attempts (punctures) was statistically highly significant, ($p < 0.001$), in group (M), compared to group (S), with median and range values [2 (2-5) and 1 (1)] respectively. Also, the incidence of hitting the bone as well as the number of bone traumata was statistically highly significant, ($p < 0.001$), in group (M), compared to group (S) The visual analogue score was statistically highly significant between the two groups and it was congruent with the incidence and numbers of attempts and bone trauma.
**Conclusion(s):** Increased incidence of Post spinal backache (PSB) is related to multiple attempts and hitting bone during the procedure. There is a closed correlation between the difficulty of technique and increased patient age and BMI. We do recommend to introduce smaller size non-traumatic spinal needles (25G pencil point needle) to our hospital to decrease the risk of PSB.

## 04AP06-10

### High spinal anesthesia due to epidural catheter migration in cesarean

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**Background:** Early detection and vigilance of high spinal anesthesia post epidural catheter migration in cesarean section leading to safe conduct of anesthesia.
**Case report:** 32 yrs old female parturient nullipara G2P0, admitted to labour ward with 4 cm cervical dilatation, an epidural analgesia was offered.
Epidural mixture was 0.125 % bupivacaine and fentanyl 2.5 mcg/ml on 20 ml normal saline syringe, the patient given 4 ml of the mixture as a bolus then after less than 5 min another 6 ml were given as top-ups . After 30 min the patient was checked again, she was able to raise and move her legs without motor block at level T10. She was on 0.1 % bupivacaine and 2 mcg/ml fentanyl, continuous infusion pump at rate 15 ml / hr.
Another epidural assessment was done found functioning analgesia at same level. At time of surgery the patient felt nauseated; anti-emetics were given. At incision time, the patient felt pain so another 5ml of epidural mixture. No perioral tingling or blurred vision was reported.
The patient suddenly started to complain from difficulty in breathing and drowsiness, her oxygen saturation suddenly started to drop so rapid sequence induction with cricoids pressure was done and she was intubated. Her pupils were reactive and dilated. She had stable vital signs. She was reversed with neostigmine and atropine An aspiration from the epidural catheter was done found a clear fluid of 10 ml sent to lab, found to be CSF sample which gives the diagnosis of epidural catheter migration.
After extubation at, the patient was conscious and obeying commands, protruded her tongue, but can't move her lower limbs, the ventilation was good on room air. After 2 hrs, she recovered completely motor power for upper and lower limbs.
**Discussion:** Once an epidural catheter has been safely inserted, it may still migrate appreciably despite efforts to secure it at the skin surface.1 Such movement of the epidural catheter may induce complications many hours after insertion. Unintentional intravenous injection of local anaesthetic2and total spinal anaesthesia3 have been reported during labor and attributed to catheter migration. A ,mobile' epidural catheter may enter the subdural space,4 generating potentially dangerous effects.
**Learning points:** Our case describes the migration of a previously functioning epidural catheter in the subarachnoid space. We think that this migration can be explained by patient posture changes and movements.

## 04AP06-11

### Horner's syndrome following epidural analgesia or anesthesia in labor

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**Background:** Horner's syndrome is rarely observed in epidural anesthesia; it is characterized by ptosis, miosis and conjunctival hyperaemia in the affected eye[1]. The incidence of Horner's syndrome with epidural anesthesia can reach 0.4-2.5% in labor analgesia and 4% in Cesarean sections[2]. In the obstetric anesthesia's department of Centro Hospitalar de Lisboa Ocidental were detected 5 cases of Horner's syndrome until the end of November 2015.
**Case report:** Parturients' ages ranged from 18 to 36 years old, all of them classified as ASA II. Only one of them had previous history of Horner's syndrome in an epidural analgesia. Four of them developed ptosis with conjunctival hyperemia after analgesic dose with 10 to 15 ml of levobupivacaine 0.25% or ropivacaine 0.2% associated with sufentanil. The fifth parturient developed the same symptoms after anesthetic dose with ropivacaine 0.75%. The mean time of onset of Horner's syndrome was 20 to 45 minutes after epidural injection and the mean time of resolution of all symptoms was 1 to 6 hours. The onset of symptoms was unpredictable; in three cases these occurred after the first administration of local anesthetic in the epidural space, in other case it happened only after the fourth administration and in the last case it occurred after the second administration. In one case of labor analgesia, the parturient developed trigeminal nerve palsy, paresthesia and mild weakness on the right upper limb. This was believed to be the result of subdural migration of the epidural catheter.
**Discussion:** In our obstetric anesthesia's department we have noticed 5 cases of Horner's syndrome in 1579 epidural techniques performed, thus corresponding to a low incidence of 0.3%. Because the onset of symptoms is unpredictable, it is up to the anesthesiologist to decide whether to use or not the epidural catheter again, always taking into account the risks *versus* benefits for each patient.
**References:**
1. Turk J Anaesth Reanim 2015;43:196-8;
2. Indian J Ophthalmol.2011 Sep-Oct;59(5):389-391;
3. M.E.J.ANESTH 20(5),2010,727-729.
**Learning points:** Most of the reported cases of Horner's syndrome in pregnant women were after epidural analgesia or anesthesia for labor. This is explained by the anatomical and physiological changes during pregnancy and labor which will favor cephalic spread of local anesthetics[3]. Early diagnosis prevents the anxiety of the parturient and it is essential for the prevention of more serious complications[1].

## 04AP07-1

### Continuous epidural analgesia for labour and delivery in a patient with demyelinating peripheral polyneuropathy

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**Background:** The prevalence of demyelinating polyneuropathies is estimated at 2-8% in adult population. The selection of the anesthetic technique to be used in these patients can be a challenge to any anesthesiologist. Our objectives are sharing our experience in a case of successful epidural analgesia for labour and delivery in a patient suffering from this disorder, as well as doing a review of the available bibliography, in order to facilitate the process of making decisions in similar cases.
**Case report:** A 28-year-old primigravid woman at 40 weeks was admitted to the labour area with ruptured membranes.The patient had a pathological history of generalized demyelinating polyneuropathy affecting the four limbs. Once the active labour had started, the anesthesiologist on call was asked to assess the possbility of performing an epidural analgesia. The case was studied by two anesthesiologists who jointly decided to perform the technique after having evaluated the available information and made sure that the patient could understand the benefits and risks. The epidural space localization and the catheter placement was made without incidents. Once finished the childbirth the catheter was withdrawn, and the sensory level was recovered as is usual.
**Discussion:** The published bibliography with reference to similar cases to ours is limited. We could only find one case report[1]of a successful continuous epidural analgesic block in a pregnant suffering from a chronic demyelinating polyneuropathy with no complications. No clear recommendations can be found in the bibliography,. Historically this disorders have been considered a relative contraindication for neuroaxial techniques due to the possibility of the appearance of complications, as well as for the possible mistake when identifying the cause of deterioration of neurological símptomes.
**Reference:**
1. Vlelickovic IA, Leicht CH. Patient-controlled epidural analgesia for labor and delivery in a parturient with chronic inflammatory demyelinating polyneuropathy. Reg Anesth Pain Med 2002; 27(2): 217-9
**Learning points:** The existing evidence is not enough to confirm the safety of neuroaxial anesthesia in patients suffering from peripheral polyneuropathy. If it is decided to proceed with the technique, it should be performed in the less traumatic way, avoiding paresthesia, epinephrine and local anesthetics in high concentrations in order to minimize the risk of damage due to direct trauma, ischemia or neurotoxicity.

## 04AP07-2

### Anesthetic experience of permanent vegetative state pregnant for cesarean section

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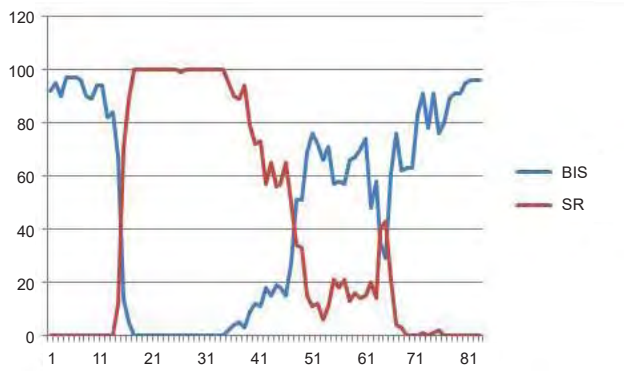
**Background:** We present here a case of anesthetic management of pregnant with permanent vegetative state
**Case report:** A 37 year-old parturient with permanent vegetative state underwent general anesthesia for cesarian section. She has a history of hypoxic brain dagame during early pregnancy period. Bispectral index (BIS) was monitored for check sedation state and initial value was 92. 5 minutes after anesthetic induction with thiopental and rocuronium, BIS value was decreased to 0 and suppression ratio (SR) value was increased to 100. So, we discontinued inhalation agents. About 30 minutes later, BIS value started to increase and SR value started to decrease. 60 min after induction SR was decreased to zero. (Figure 1.)
Total anesthetic time was 75 minutes and patient transferred to recovery room with adequate self respiration. On the next day, neurologist examined the patient's neurologic state and there were no changes compared with preoperative state.



*[Figure 1]*

**Discussion:** Traditional dose of anesthetic agent can cause severe decrease in BIS value and burst suppression in permanant vegetative state patient. So, we should carefully use anesthetics and BIS monitoring can be helpful.
**References:**
1. Ayorinde, B. T., I. Scudamore, et al. (2000). "Anaesthetic management of a pregnant patient in a persistent vegetative state." Br J Anaesth **85**(3): 479-481
2. Pandit JJ., B. Schmelzle-Lubiecki, et al. Bispectral index-guided management of anaesthesia in permanent vegetative state. Anaesthesia. 2002;**57**(12): 1190-1194.
**Learning points:** Anesthetic experience of permanent vegetative state patient is very rare. We should remind that the effect of anesthetic agent is unpredictable, so careful monitoring and dose titration should be performed.

## 04AP07-3

### The challenge of spina bifida occulta for obstetric anaesthesia

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**Background:** Spina bifida (SB) occulta (O) is the mildest form of SB disorders, occurring in 5-36% of otherwise healthy individuals.[1] Provision of labour analgesia in pregnant women with SB continues to be a challenge due to technical difficulty and unpredictable results. Neuroaxial anaesthesia and analgesia is the current choice in obstetric population.
**Case report:** A 36 years old woman with incidental X-Ray finding of SBO at L5-S1 with no neurological symptoms. The patient started labour induction at 40 weeks of gestation and requested for epidural analgesia.
Obstetric history: Caesarean Section (CS) 2 years ago under general anaesthesia (GA). After careful pre-operative examination with no anomalous findings it was decided to perform an epidural technique above the level of the lesion (L3-L4) in sitting position, for management of labour. The epidural was performed using "loss of resistance to saline", without any difficulty. An initial bolus of 14 ml ropivacaine (R) 0.1% and sufentanyl (S) 0.01 mg was administered. One hour later it was started a PCEA protocol of continuous perfusion of 5 ml/h of R 0.1% and S with SOS bolus of 5 ml at patient demand, with lockout interval of 20 min. During the analgesia period a total volume of 70 ml was administered. Due to labour arrest a CS was performed, under epidural anaesthesia with 10 ml R 0.75% and 0.01mg S, uneventfully. Epidural catheter was maintained during two days for postoperative analgesia with morphine 2mg every 12h and R 0.1% 10ml on patient demand. Per os ibuprofen and paracetamol were administered to complement analgesia. The anaesthetic consumption and dispersion was similar to other pregnant patients. No complications were reported during 48h post-delivery and long-term. The overall level of patient's satisfaction was high.
**Discussion:** The use of neuroaxial techniques in patients with SBO has been reported but is limited to anecdotal case reports. Definitive recommendations regarding the safety of neuraxial anaesthesia or analgesia in patients with neural tube defects aren't available, therefore decision making is individualized.
More research is needed to determine the standard for anaesthetic management of this population.
**References:**
1. Chestnuts Obstetrics Anaesthesia 5th Ed;
2. IJOA. 2015 Aug; 24 (3); 252-263
**Learning points:** Neuroaxial anaesthesia appears to be safe in patients with SBO and could provide optimal management for labour. In this case GA, which wasn't free of risks, was avoided.

## 04AP07-4

### Posterior Reversible Encephalopathy Syndrome (PRES): difficult diagnosis in paripartum period

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**Background:** Posterior Reversible Encephalopathy Syndrome (PRES) is a clinicoradiologic syndrome that has been associated with numerous systemic conditions in both obstetric and non-obstetric patients of all age categories[1]. The most common symptoms are headache, vomiting, confusion, seizures, visual abnormalities and motor signs. It is thought to be caused by an increase in blood pressure with endothelial cell dysfunction, surpassing cerebral autorregulation, causing vasogenic edema.
We describe this rare syndrome in a postpartum woman, pointing difficulties the differential diagnosis.
**Case report:** A 26-year-old healthy female, post non-complicated pregnancy developed headaches, 3 days after cesarean under spinal anesthesia. Few hours later, she complained of dyspnea at rest and we detected desaturation and a rise in blood pressure (150/85 mmHg).
Afterwards, bilateral blindness and generalized tonic-clonic seizures arise, requiring sedation and orotracheal intubation with subsequent admission in the Intensive Care Unit for further research. Head and thorax CT scan detected signs of pulmonary edema and bilateral pleural effusion. Laboratory tests didn't show relevant data.
Continuing study, brain MRI revealed bilateral cortico-subcortical and occipito-parietal hyperintensity in FLAIR sequences, compatible with PRES diagnosis. Pulmonary congestion and vision recovered completely after treatment with furosemide and magnesium sulfate. Normotension was achieved in one week. The brain MRI was repeated a week later showed complete reversal of the initial changes.
**Discussion:** While the majority of these situations can be treated, PRES is not always reversible nor limited to the posterior aspects of the brain or white matter. The anesthesiologist and intensivist should be aware of the confounding factors that may defer the correct diagnosis. Prompt diagnosis and treatment are paramount to prevent permanent sequelae.
**References:**
1. Obstetrical and Gynecological Survey (2014); 69: 5.
2. International Journal of Obstetric Anesthesia (2007); 16: 74-76.
3. The Journal of Emergency Medicine (2007), Vol. 33, No. 4, . 377-379.

## 04AP07-5

### Anesthetic management of idiopathic intracranial bleeding during pregnancy: a case report and review

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**Background:** Intracranial hemorrhage (ICH) is uncommon during pregnancy representing 10 % of non-obstetrical causes of maternal death[1]. Most frequent cause is Subarachnoid Hemorrhage (SAH). We analyze anesthetic issues in the management of SAH during pregnancy.
**Case report:** A 29 week pregnant women, presented with headache, right side weakness, and disturbed sensorium (GCS 8/15).Cerebral Computed Tomography (CT) showed posterior fossa SAH extending to right suprasellar cistern and Cerebral Angiography (CA) showed a normal vasculature. Lab tests rule out coagulopathy. Patient developed progressive elevation of Intracranial Pressure (ICP) and urgent decompressive craniotomy was mandatory.
Surgery was conducted without ending pregnancy under general anesthesia (GA).15 days later patient achieve neurological recovery and was discharged. An elective caesarean was performed at 37 week under GA.No complications were registered.
**Discussion:** Once diagnosed SAH during pregnancy, identifying the cause becomes essential to avoid rebleeding. We describe a rare case of SAH in which common causes as AVM or aneurysms were ruled out by CA. False negative findings could be explained by spontaneous thrombosis of small ruptured aneurysm. This tiny thrombosed vessels are barely visible. Prothrombotic changes of pregnancy facilitate this scenario. On doubtful cases Cerebral Digital Subtraction Angiography may be useful[2]. Acute treatment of the ICH must ensure maternal and fetal well being. Obstetrical and neurosurgical procedures in pregnant patients with SAH can be safely performed under anaesthesia. GA allows a better control of hemodynamic and respiratory variables. Less often regional anaesthesia can be used, but contraindications should be considered[3].
**Learning points:**
- Election of anaesthetic technique will be determined by maintenance of cardiovascular stability
- Neuroprotection of these patients compels to set up a proper invasive monitoring and use of pharmacological and non-pharmacological interventions to treat ICP
- Perioperative care of this patients should be conducted by a multidisciplinary team

**References:**
1. Mas JL,Et al.Stroke in pregnancy and the puerperium.J Neurol.1998;245:305-13.5
2. Agid R,Et al.Negative CT angiography findings in patients with spontaneous SAH: when is DSA still needed?AJNR.2010;31(4):696
3. Anson JA, Et al.Anesthesic management of labor and delivery in patients with elevated intracranial pressure.Int J Obstet Anesth.2015;24:47-54

## 04AP07-6

### Analysis of French civil court cases in obstetrics: how is anesthesia involved? (SHAM insurance data)

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**Background and Goal of Study:** Obstetrics is a high-risk specialty where the responsibility of the team and therefore the anesthetist can be engaged [1]. The knowledge of these claims must help to improve practices. SHAM insurance is the leading provider of medical liability insurance in France (50 % of the market), insuring 80 % of public and 27% of private hospitals. The study of the insurance claims provided by this insurer is therefore a relevant source of data.
**Materials and methods:** The aim of this study was to analyze the medico-legal claims related to obstetrics and to seek the involvement of anesthesia. We did a retrospective study of 180 insurance claims provided by SHAM insurances since 1981 and which were settled by a court between 2012 and 2014 (therefore potentially the most serious).
Only claims definitively closed in terms of compensation as of May 1, 2015, were included (the claims with the compensation waiting for the legal age of majority regarding the child involved were excluded). Data were extracted from the SHAM database.
**Results and discussion:** We analyzed 76 definitely closed claims that occurred between 1981 and 2012 in French public hospitals (42 general hospitals and 20 universities), private (6) or among health professionals (8). The average time between the declaration of the claim and the court conviction was 5.3 years (median=4.7 years, min=1.4 and max=23.4).
The damage occurred during natural childbirth (24), cesarean delivery (24), monitoring of pregnancy (14), anesthesia (6) or during another moment (5).
The consequences are very important: death of the newborn (22), cerebral palsy (6), death of the mother (2), brachial plexus injuries (3), fetal death in utero (2) or mother reoperation (14).
**Conclusion(s):** The causes identified by the expert are always multifactorial with generally a human error and/or a delay in medical care:
- error in medical care : misdiagnosis (16), error in the decision (22), error in care by a midwife (7), technical error by an obstetrician (19).
- lack of organization and functioning in the service (10)
- delay in medical care to perform a caesarean (8)
- nosocomial infection (7)

The obstetric causes appear as the most serious and frequent.
The anesthetist is involved only in 6 cases and the claim is always associated with an obstetrical cause regarded as the most serious.
These data should help strengthen the quality approach in obstetrics.
**References:**
1. *J Gyn Obs Biol Reprod* 2015; A.Theissen, in press

## 04AP07-7

### Obstetric anesthesia claims in French hospitals: a study based on French insurance (SHAM) data

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**Background and Goal of Study:** Obstetrics carries high medical liability risk. Maternal death and newborn death/brain damage are the most common complications in obstetric anesthesia malpractice claims in USA [1] and in France [2].
The aim of the study was to analyze closed claims in obstetric anesthesia provided by SHAM insurance between 2007 and 2014. SHAM insurance is the leading provider of medical liability insurance in France.
**Materials and methods:** Retrospective study of SHAM insurance closed claims settled amicably or by a court.
**Results and discussion:** Obstetric anesthesia was involved in 99 cases among 3083 obstetric claims over the period (3.2%). The damage occurred in public hospitals (54% in general and 28% in university hospitals), private hospitals (14%) or among health professionals (4%).
The damage occurred during natural childbirth (60%), cesarean delivery (38%) or an abortion (2%). The main type of anesthesia was epidural (75%), rachianesthesia (20%), general anesthesia (3%) or none (1%). The type of anesthesia involved was regional (93%) or general (7%).
The claims for regional anesthesia occurred during its administration (42%) or after during hospitalization (81%) (>100% because of combined reports)
12 complications during regional anesthesia (accidental dural puncture (ADP) or failure) required general anesthesia (involving 1 respiratory arrest after ADP and 1 acute subdural hematoma on day 2). In addition one general anesthesia caused complications with anaphylactic shock (succinylcholine) and difficult inhalation after intubation leading to brain damage.
The claims filed because of general anesthesia were linked to two anaphylactic shocks (death after abortion and brain damage after cesarean section) and pelvic pain after abortion.
Finally there have been 54 brain damage (from monoparesis to vegetative coma), 2 deaths, 6 moral damages and 37 other causes.
Only 2 cases were settled by a civil court, the others amicably.
**Conclusion(s):** Obstetric complications (subjected to a claim) rarely involve anesthesia.
The consequences of regional anesthesia are significant and the use of general anesthesia, though incidental, can still cause additional complications.
Due to the quality of medical information, available in the medical file, and the absence of medical malpractice, the medical responsibility is rarely at risk.
**References:**
1. Anesthesiology 2009;110(1):131:9
2. J Gyn Obs Biol Reprod 2015; A.Theissen, in press

## 04AP07-8

### Management of the obese obstetric patient

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**Background and Goal of Study:** In the United Kingdom obesity is increasing. Over the last 20 years numbers of obese pregnant women have doubled. Complications from obesity during pregnancy have significant implications for the mother and newborn, and women who die during pregnancy are more likely to be obese.[1]
Accurate booking BMIs must be calculated as self-reported weight is often underestimated, especially in obese women. The CMACE/RCOG joint guideline recommends that obese women be re-weighed in the third trimester to enable appropriate planning and management.[1]
We prospectively audited practice within Royal Hampshire County Hospital (RHCH) for calculating booking BMI's, weighing patients on admission and informing the anaesthetist about obese patients.
**Materials and methods:** Patients admitted to labour ward were randomly selected between June and July 2015. Information was collected on their booking weight, booking BMI, admission weight and whether the duty anaesthetist had been informed following their admission.
**Results and discussion:** Data was obtained on 42 women in labour. All had a booking weight recorded and 39 (93%) had their BMI calculated from this. 81% of booking weights were recorded in kilograms. However 19% were recorded in imperial measurements, requiring conversion to metric units for drug dosing, particularly enoxaparin, introducing room for error. It also indicated that weights were possibly estimated by women themselves. Obese women with BMI >40 may not be identified.
11 (26%) women were obese (6 had a BMI >30 and 5 BMI >40). Of patients whose BMI was >40, the anaesthetist was informed following admission about 4 (80%).
Only 8 women were re-weighed following admission. Average weight gain was 10.5kg (2.7kg-23kg).
The largest increase in weight was 23kg. Similar weight gains during pregnancy may have been missed. This could affect obstetric and anaesthetic management. Evidence is lacking on which weight should be used for drug dosing, which could lead to significant under-dosing.
**Conclusion(s):** We recommend accurate height and weight is taken during booking appointments using appropriate (metric) equipment to calculate an accurate BMI. If BMI is over 30, weight should be repeated following admission.
The duty anaesthetist should be informed when a parturient with a BMI >40 is admitted. Consensus opinion on which weight to use for drug dosing is needed.
**Reference:**
1. Modder J, Fitzsimons K. *CMACE/RCOG Joint Guideline*. 2010

## 04AP07-9

### Anesthetic management of Cesarean section on Behçet's disease - a case report

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**Background:** Behçet's disease (BD) is a chronic vasculitis that affects mostly young adults. It is characterized by recurrent oral ulcers, genital ulcers and uveitis. Although the most common manifestations are skin and eye lesions almost every organ can be involved. BD is also associated with a higher risk of thromboembolic events[1].
**Case report:** A 28 year old woman with BD (G1, P0, 38 weeks), was proposed for a cesarean section due to fetal breech presentation. She had no history of past surgeries or experience with anesthesia. Her pregnancy was uneventful. The patient had recurrent oral and genital ulcers and relapsing nodules resembling erythema nodosum in her lower extremities. She had no skin lesions on her chest, trunk or back and no other manifestations of the disease. She wasn't under any treatment, except for topical mometasone. Mouth opening demonstrated a Mallampati class II airway and numerous ulcers. The preoperative laboratory values were normal.
The patient underwent a successful single puncture spinal anesthesia with bupivacaine 0.5% (11.5mg) and morphine (100μg).
After surgery she was under a prophylactic dose of low molecular weight heparin (LMWH) for one week.
**Discussion:** The main concerns in this case are: the difficult airway risk due to scarring from recurrent ulceration, the inflammatory responses to skin prick and the higher risk of thromboembolic events. Although regional anesthesia is less ideal because it involves skin puncture, the airway risk is far more severe with the possibility of a difficult intubation and the worsening of pre-existing oral lesions[2].
The choice between combined spinal/epidural and spinal anesthesia relied on the fact that spinal anesthesia alone was less invasive. There would be also a higher risk of inflammatory local skin response if an epidural catheter had been placed and used for postoperative analgesia.
A prophylactic dose of LMWH was considered essential to prevent thromboembolic events since pregnancy and BD increase the risk of thromboembolism.
**References:**
1. Gupta, Anurag et al. *Repeated Surgeries in a Patient with Behçet's Disease, What Changes to Expect?* Anesthesia, Essays and Researches 7.2 (2013): 279-281.
2. Bhalerao, PM et al. *A Case of Behçet's Disease Posted for Surgery: Anaesthetic Implications.* Indian Journal of Anaesthesia 59.8 (2015): 517-519.
**Learning points:** Anesthetic management of any patient should take into consideration underlying diseases, adapting to their own challenges.

## 04AP07-11

### Pseudoxanthoma Elasticum in pregnancy - anesthetic and surgical considerations

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**Background:** Pseudoxanthoma Elasticum PXE is a rare inherited connective tissue disease characterized by degenerative changes due to calcification and fragmentation of elastic fibers on the skin, eyes and cardiovascular system.
There are very few reports of Labor Analgesia (LA) in pregnant women with PXE. We found only 2 cases in the literature.
The aim of this study is to describe the analgesic approach and discuss the main anesthetic and surgical particularities in this parturients.
**Case report:** A 37year-old pregnant women, ASA II, with PXE, dyslipidemia, obesity.
She had a history of infertility with medically assisted reproduction, which resulted in 2 pregnancies followed by abortion with organ dysfunction and need for ICU care. The present pregnancy was naturally conceived and was held without complications besides an elective cervical cerclage at 17w.
The examination showed yellow spots on folds and fibrotic streaks in the retina, all of these PXE features, and cardiomegaly on the chest x-ray.
Based on the literature and in the face of her condition, we proposed Regional Analgesia RA: epidural and a normal delivery that the patient accepted.
Labor progressed uneventful and delivery time was reduced through the use of forceps. During placental removal the umbilical cord ruptured, which led us to the OR for the internal manual removal of the remaining placenta under close monitoring providing a safer procedure. The procedure was performed under an epidural bolus and sedation with good control of vital signs.
In the postpartum period, there were no obstetric or anesthetic complications.
**Learning points**: Close monitoring and control of heart rate and blood pressure is critical, due to premature development of atherosclerosis and risk of acute myocardial infarction.
RA allows for better haemodynamic stability during childbirth. There is less chance of bleeding from injured arteries and reduced cardiac work.
There may be bleeding from the retina secondary to the Valsalva maneuver during the second stage of delivery. Instrumentation is recommended to shorten its duration.
Beware that necrotic changes and placental mineralization are more common in these pregnant women, which can present as a complication during labor.
This case of success using a RA for Labor in patients with PXE may be helpful aiding in the most appropriate analgesic choice in these cases, taking into account the few cases described and anesthetic implications still poorly known.

## 04AP08-1

### Ex utero intrapartum therapy (EXIT) carried out with Glidescope® for 4th branchial cleft cyst

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**Background:** During EXIT (ex utero intrapartum therapy) [1,2], intubation in a condition under fetoplacental circulation is highly stressful to anesthesiologists. On top of that, it is different from typical intubation situations, because the fetus is on its mother's abdomen.
However, a video laryngoscope brings a more comfortable situation to an operator to conduct intubation since he or she can check the vocal cord with a monitor that is connected to the camera. Moreover, surgeons can also identify the success or failure of intubation by watching the monitor with several other people involved in the surgery, allowing next procedures of the surgery to proceed more smoothly.
This writer reports, as the first time in the world, a successful case of intubation using a Glidescope® for a patient in need of EXIT.
**Case report:** A 28-year-old female patient, with 38 weeks of pregnancy and presented with a fetus with left cystic neck mass that was diagnosed by prenatal ultrasound at her 25th week of pregnancy, scheduled a cesarean section.
After rapid sequence induction with thiopental and succinylcholine, intubation was done. Anesthesia was maintained with 50% of $O_2$, $N_2O$, 2.0-2.5 vol% sevoflurane and cisartacurium.
After the hysterotomy, the head, trunk, and left upper limb of the fetus were externalized, preserving the uterine volume and fetoplacental circulation. The fetal tracheal intubation was achieved under video-laryngoscope (Glidescope®), with a 3.5 non-cuffed tube, 3 min after hysterotomy. At the 7th day of birth, the baby successfully took the surgery of eliminating the 4th branchial cyst under general anesthesia.
**Discussion:** Anesthesiologist could successfully and more comfortably conduct airway management by using a video-laryngoscope than when using a direct laryngoscope as usual. Since a video-laryngoscope allows a certain distance between an operator and a patient, it can easily succeed intubation even when the patient is not on a flat place and neck extension is not fully performed.
**References:**
1. Oliveira E, et al. Anesthesia for EXIT procedure in congenital cervical malformation - a challenge to the anesthesiologist. Braz J Anesthesiol. 2015;65:529-33.
2. Ngamprasertwong P, et al. Update in fetal anesthesia for the EXIT procedure. Int Anesthesiol Clin 2012;50:26-40.
**Learning points:** As this case, this writer concludes that a video-laryngoscope can be more useful than a direct laryngoscope in EXIT.

## 04AP08-2

### Ultrasound guided identification of the crico-thyroid membrane to facilitate front of neck access in obese parturients; a feasibility study

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**Background:** Cricothyrotomy is recognised as a potentially life saving airway management technique in the Can't Intubate, Can't Oxygenate scenario (CICO). The technique involves rapid and accurate palpation and identification of structures to facilitate Front of Neck Access (FONA). However, identification of these structures is difficult in obese parturients, due to adipose tissue deposition. We hypothesised that the use of ultrasound would facilitate accurate and speedy identification of the key landmarks.
**Methods:** Following IRB approval, we recruited volunteers from the Complex Obstetric Anaesthesia Clinic at University Maternity Hospital Limerick, with BMI > 35 to participate in a double blinded, cross over investigation. Under control conditions, the cricothyroid membrane was identified by the first investigator using both ultrasound and palpation technique. The site was marked with a UV light visible pen. Under test conditions the second investigator marked the site using both techniques, and was timed using both methods.
**Results:** The Ultrasound technique was positively skewed Median 2 (IQR 1,4) vs Landmark postively skewed Meidan 4 (IQR 2,8) based on controls ($p=0.001$, wilcoxin signed rank test). Mean time for US was 25.6 seconds compared to Landmark measures 16.87 ($p=0.001$).
**Conclusions:** The Ultrasound technique for identification of the cricothyroid membrane is significantly more accurate than traditional palpation methods in obese parturients, and can be carried out rapidly under clinical conditions. It will improve safety and limit complications and could become part of routine clinical airway examination.

## 04AP08-3

### Sleep disordered breathing symptoms in a socioeconomically disadvantaged pregnant population

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**Background and Goal of Study:** Pre-eclampsia, gestational hypertension and diabetes and fetal growth restriction are associated with sleep disordered breathing in pregnancy. Recognition of SDB in pregnancy is difficult as women report less sleep symptoms and poor quality of sleep is expected. The goal of this study looking at SDB symptoms in a socioeconomically disadvantaged pregnant population before and after 20 weeks gestation was to ascertain when sleep symptoms occur in pregnancy, feasibility of question-

naire screening and detect associated maternal and fetal outcomes in this underrepresented population?
**Methods and materials:** After IRB approval we recruited socioeconomically disadvantaged (Medicaid) pregnant women aged > 18yo, to complete sleep questionnaires before and after 20 weeks gestation. The four sleep questionnaires administered included; STOP, Epworth sleepiness scale, General sleep disturbance scale, a pregnancy specific questionnaire, as well as Edinburgh Postnatal Depression, restless leg syndrome and short demographic questionnaires. After completion of the questionnaire data set, patient medical data was also reviewed.
**Results and discussion:** Paired analysis of questionnaire sets using McNemar and Wilcoxon Signed Rank Sum tests, show for prospective, preliminary data from 18 patients, a significant increase in BMI ($p<0.0005$) after 20 weeks gestation. Preliminary results show trends towards significance with increased snoring (20.69% vs.29.41%), daytime sleepiness (72.41% vs. 76.47%) and depression symptoms (6.9% vs. 23.53%). Women who exceeded recommended weight gain during their pregnancy, conditional on their starting BMI, were more likely to undergo cesarean section
(72.73% vs.60%) and have a diagnosis of gestational hypertension in pregnancy (33.33% vs. 0%). Detection of SDB symptoms in a socioeconomically disadvantaged pregnant population is difficult and currently no ideal screening tool exists. SDB symptoms in this group are associated with increases in maternal hypertensive disease and depression, as well as cesarean delivery which overall represents significant healthcare expenditure.
**Conclusion:** A significant increase in BMI after 20 weeks gestation is associated with rises in snoring, daytime sleepiness and depression symptoms. Women with above recommended maternal weight gain and increasing SDB symptoms trended to undergo Cesarean delivery and have more hypertensive disease of pregnancy.

## 04AP08-4

### Videolaryngoscopy in obstetrics: A comparison between the KingVision video laryngoscope, the C-MAC video laryngoscope and direct laryngoscopy for airway management during C-section

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**Introduction:** There are few reports of using videolaryngoscopy to manage the airway for C-Section. We found no study evaluating the use of the KingVision videolaryngoscope for airway management in obstetric anaesthesia. We report preliminary findings of the randomized comparison to the C-Mac videolaryngoscope and direct laryngoscopy using time to intubation as our primary outcome measure.
**Methods:** Following approval of the ethics committee, 165 patients undergoing C-Section were planned to take part in the study. Patients with predicted difficult airway were excluded. We recorded time to intubation, success rate, time to optimal glottic view, number of attempts, Cormack-Lehane grade, the need for optimisation manoeuvres and intubation difficulty score (VAS 0-100) Failure of the procedure was declared if intubation was not successful after 60 s and if $SaO_2$ dropped $\leq$92%. Intubations were video recorded using the C-MAC and King Vision recording facility. We used SPSS v 21 to analyse the data: ANOVA for normally distributed continuous data, Kruskal-Wallis for non-normally distributed continuous and ordinal categorical data and Chi-Squared test for nominal data.
**Results:** We report preliminary findings from 161 parturients with mean (SD) age (29.3 ± 4.2 years) and BMI (32.4±5.2 $kgm^{-2}$). We recorded no failures of intubation. In only six patients the second attempt at intubation was needed. There were also no difference in time to successful intubation between the three devices. Time to optimal glottic view was significantly longer with the KingVision VL ($p=0.009$) due to higher need for optimization manoeuvres ($p<0.0001$). Once the optimal laryngeal view was obtained, the highest rate of grade 1 views was recorded after the KingVision videolaryngoscopy ($p<0.0001$). The intubation difficulty score was significantly lower with the C-MAC videolaryngoscope ($p=0.003$).
**Conclusion:** This study found no significant difference in time to intubation between the three tested devices. The KingVision videolaryngoscopy needed larger number of optimization manoeuvres for obtaining the optimal laryngeal view in obstetric patients. However, in parturients with suboptimal view, the KingVision VL may improve the glottic view to facilitate intubation. The C-MAC videolaryngoscope could serve as a standard intubation device for airway management for C-section since it combines the benefits of conventional direct laryngoscopy and videolaryngoscopy in one device.

## 04AP08-5

### Chest circumference to sternomental distance ratio and weight gain are new predictors of difficult intubation in obstetric patients. Observational prospective study (preliminary results)

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**Background and Goal of Study:** This study was performed to assess the ability of the weight gain during pregnancy and the ratio of the chest circumference to sternomental distance (CC/SMD), to predict difficult intubation in obstetric patients.
**Materials and methods:** Chest circumference, sternomental distance, neck circumference weight gain were evaluated in 39 pregnant woman undergoing cesarean section delivery under general anesthesia. Patients were divided into 2 groups according to their cormack laryngoscopic view:
- Group E (easy intubation) : for cormack I or II.
- Group D (difficult intubation): for cormack III or IV.

Then we compared the chest circumference to sternomental distance (CC/SMD) and the weight gain in both groups.
**Results and discussion:** In this study we noted 7 cases in group D versus 32 in group E. Body mass index was 28.5 in group E versus 31.1 in droup D ($p=0.01$). Weight gain was 9.1 in droup E versus 11.3 in droup D with $p=0.003$. Chest circumference to sternomental distance was 6.9 in group E versus 8.1 in group D with $p=0.026$.
**Conclusions:** Chest circumference to sternomental distance ratio is a new method for predicting difficult intubation in obstetric patients when it exceeds to 8 and weight gain during pregnancy may lead to difficult laryngoscopic view when it exceeds to 11 kg.

## 04AP08-6

### Comparison of macintosh direct laryngoscope and c-mac video laryngoscope used for orotracheal intubation in elective cesaraen section operations

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**Background and aims:** In this prospective clinical study we aimed to compare C-MAC VL and Macintosh DL used for orotracheal intubatin in elective cesarean section operations.
**Methods:** After ethics committee approval 100 pregnant women were included in the study. Patients were separated in two groups randomly in orotracheal entübation as Storz C-MAC videolaringoskop (VL) or Macintosh blade with direct laryngoscopy (DL) applied patients. Intubation time and the number of attempts for intubation was recorded. CL (Cormack-Lehane) classification and POGO (Percentage of glottic opening) score were used for assessment of the larynx during laryngoscopy. Perioperative heart rate (HR), blood pressure (BP) peripheral oxygen saturation (SpO2) were recorded before induction of anesthesia and after intubation. End-tidal carbon dioxide (EtCO2) were recorded immediately after the intubation. The patients were evaluated after extubation for complications. Student's -test was used for between-group comparisons. Categorical data was compared using Chi-square test.
**Results:** POGO scores ( 95±10/69,4±22) and intubation time (21,1±7,3 / 15,8±5,7) was significantly higher in GROUP VL compared with GROUP DL ($p<0.001$). In Group DL, CL classification values were observed as statistically significantly higher ($p<0.001$). In Group DL 1 patient was observed as CL 3, in Group VL, CL 3 was not observed. There is no statistically significant differences between the groups in terms of intubation condition score (straining reflex and limb movement after intubation) BP, HR, SpO2, EtCO2 values and complications ($p> 0.05$). In both VL and DL group, difficult mask ventilation and the need to use airway were not encountered.
**Conclusion:** In pregnant patients who has a high risk of difficult airway, VL is a good alternative method to the DL for routine use. However, duration of laryngoscopy and total duration of intubation were significantly higher in VL group.

## 04AP08-7

### Airway management for general anesthesia cesarean delivery in a non-specialist management practice

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**Background:** General anesthesia should be avoided for cesarean delivery (CD) due to associated higher maternal morbidity. (1) It is recommended for intubation during general anesthesia CD that an endotracheal tube (ETT) size 7.0 or smaller be used. We investigated airway management and ETT size used for general anesthesia CD in a non-specialist practice in a tertiary medical center.
**Methods:** Women who had CD from 02/2007 to 11/2015 were identified from an anesthesia information management system (AIMS) (Metavision, iMDsoft, Tel-Aviv, Israel). We identified all women who received general anesthesia, and we report airway management. We used logistic regression to identify factors associated with use of ETT greater than size 7.0.
**Results:** Within the study cohort, 10,674 women had CD; 1394 (13%) received general anesthesia. The ETT size used was median(IQR)[range] 7 (7-7.5)[5-8], and 312 (22.6%) women received an ETT greater than size 7.0. ETTs were placed using direct laryngoscopy for 542 (92.0%) cases, fiberoptic intubation in 1 (0.2%) case, and video-assisted in 37 (6.3%) cases. There were 12 (2.0%) cases of difficult and 1 (0.2%) case of impossible intubation.
In our multivariate model, maternal body weight below 70kg (aOR 0.59, 95%CI = 0.44-0.80), emergency CD (aOR 0.75, 95% CI = 0.57 - 0.99), and anesthesia performed by a specialist obstetric anesthesist (aOR 0.57, 95% CI = 0.34 - 0.95) were associated with a greater likelihood that the ETT placed was size 7.0 or smaller.
**Conclusion:** Using the AIMS for over 10, 000 CD, we report a general anesthesia rate of 13%, and our impossible intubation rate was 0.2%. The likelihood of placing a larger than recommended ETT (above 7.0) was increased among women with maternal body weight 70kg or greater, in elective CD, and when placed by an attending, non-obstetric anesthetist. Utilization of the AIMS enables identification of obstetric anesthesia practices that necessitate attention such as choice of ETT size for general anesthesia CD.
1. Butwick AJ. Racial and Ethnic Disparities in Mode of Anesthesia for Cesarean Delivery. Anesth Analg. In Press.

| | N (%) | aOR | 95% CI |
|---|---|---|---|
| Maternal weight | | | |
| Above 70 kg | 414 (29.7%) | 0.59 | 0.44 - 0.80 |
| Below 70 kg | 980 (70.3%) | | |
| ASA | | | |
| 1 or 2 | 1294 (92.8%) | 1.63 | 0.92 - 2.87 |
| 3 or greater | 100 (7.2%) | | |
| Cesarean delivery | | | |
| Elective | 484 (34.7%) | 0.75 | 0.57 - 0.99 |
| Emergency | 910 (65.3%) | | |
| Laryngoscope View | | | |
| 1 | 1056 (75.8%) | 1.20 | 0.88 - 1.64 |
| 2 or greater | 338 (24.2%) | | |
| Attending, Specialization | | | |
| OB Anesthesia | 129 (9.3%) | 0.57 | 0.34 - 0.95 |
| Other | 1265 (90.7%) | | |

Key: aOR = adjuted Odds Ration; CI = confidence interval

*[Table. Factors associated with use of endotracheal tube greater than 7.0]*

## 04AP08-8

### Subarachnoid morphine versus TAP Block for enhanced recovery after cesarean section delivery: a randomized controlled trial

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**Background and Goal of Study:** Subarachnoid morphine is widely used for pain relief in enhanced recovery program after cesarean section inspite of its side effects. However, the role of TAP block is still controversial. The aim of our study was to compare the impact of these analgesic techniques (subarachnoid morphine and TAP block) on enhanced recovery after cesarean section.
**Materials and methods:** In this randomized consecutive controlled trial, we included 86 patients scheduled for cesarean delivery under spinal anesthesia. Patients were randomized in two groups. Group I: received spinal anesthesia with 100 $\mu$g of subarachnoid morphine Group II: received spinal anesthesia without subarachnoid morphine followed by an ultrasound guided TAP block. We assessed the time required for mobilization, for re-establishment of gastrointestinal transit.
**Results and discussion:** TAP block allowed earlier post operative mobilization. Time required for getting up was significantly lower in group II (9.4h versus 6.9 h; p=0.024) as well as time required for walking (12.4h versus 7.4 h; p=0.001). TAP block allowed earlier re-establishment of gastrointestinal transit (11.2h in group I versus 8.1h in group II; p<0.001).
Nausea and vomiting were seen in 16 patients in Group I versus 4 patients in group II (p= 0.022). Pruritus was seen in 15 patients in Group I versus no 90 patient in group II (p<0.001). and urine retention was seen in 4 patients in Group I 91 versus no patient in group II (p=0.116). However, pain relief was longer with subarachnoid morphine.
**Conclusion:** TAP block seems to be suitable with enhanced recovery programs. It allows us to avoid subarachnoid morphine side effects that may delay recovery.

## 04AP08-9

### The sensory level at the onset of postoperative pain after caesarean section

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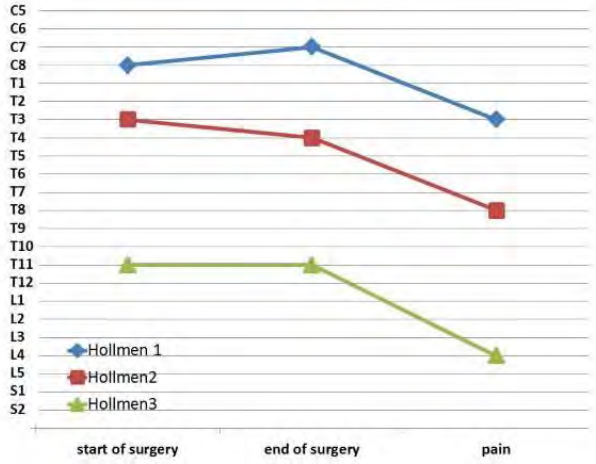
**Background and Goal of Study:** Postoperative epidural analgesia may be started immediately after surgery, before the regression of the block to prevent the occurrence of pain, or upon the patient's request. Regression of the sensory block in 2 segments is frequently used as an indicator of block regression, but there is no evidence as to whether it may be predictive of onset of postoperative pain1.
**Materials and methods:** We studied 39 full term, healthy parturients undergoing elective caesarean section under combined spinal-epidural anaesthesia. Assessment of spread and density of sensory block was performed in each dermatomal level bilaterally for loss of pinprick sensation, according to the 0 to 3 Hollmen's scale2.
Pain intensity was evaluated with the VAPS scale (0-100). Assessments were made before the start of and at the end of surgery and when the patients reported the occurrence of pain postoperatively (VAPS≥30).
Data were analyzed using the Tukey-Kramer multiple comparisons test. A P value <0.05 was considered to be significant.
**Results and discussion:** Taking into account only the height of the block, we found that a 4-5 segments regression is predictive of onset of post operative pain and that a sensory block to T3 is associated with the onset of postoperative pain in 73% of patients.
However, when the density of the block was also taken into consideration, all the patients complaining of pain had the following mean upper level of sensory block: T3 (Hollmen scale =1); T8 (Hollmen scale=2) and L4 (Hollmen scale=3) (P<0.001).




*[Median dermatomal level]*

**Conclusion(s):** Both spread and density of sensory block should be used to predict the onset of postoperative pain.

**References:**

1. Curatolo M et al. Clin J Pain 1999; 15: 6-12;
2. Camorcia M et al. EJA 2006; 23:611-17

## 04AP08-10

### Low dose epidural morphine after caesarian section as effective as standard dose? A randomized control trial

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**Background and Goal of Study:** The anesthesiologist is responsible for an effective analgesia after caesarian, contributing to the well-being of the mother and the minimization of postoperative complications, such as venous thromboembolism, through implementation of early ambulation.
The main objective of this paper is to point out the evidence of effectiveness in postoperative pain control of elective or urgent caesarian section, with confirmation of lower incidence of adverse effects, using a dose of epidural morphine never tested to date, which corresponds to 1/3 of the standard dose used in most centers.
**Materials and methods:** 50 term parturients undergoing cesarean delivery under epidural anesthesia were enrolled in this study. Patients were randomly allocated to receive either 3 or 1 mg epidural morphine. In addition, subjects received regular systemic ketorolac and acetaminophen. Rescue analgesia (iv metamizole) was administered for breakthrough pain. Pain intensity at rest and on movement using a verbal response scale (VRS 0-10) was regularly assessed for 48 hours. The primary outcome was pain control at rest (VRS<4/10) 24 hours post-operatively the difference between groups in total rescue analgesia consumption within the first 24 hours. Secondary outcomes included pain scores at 6,12 and 48 hours post-operatively (rest/mobilization), incidence of adverse effects (sedation, nausea/vomiting, pruritus, urinary retention and ileus) and maternal satisfaction. Statistical analysis was performed with SPSS - Statistics for Windows (Version 20.0. Armonk, NY: IBM Corp)
**Results and discussion:** Results showed no significant differences in pain relief at rest within 24 hours. The incidence of nausea, vomiting, pruritus, and urinary retention was significantly lower in the 1 mg group and time to recovery of bowel function was shorter. The 1 mg group had higher rates of satisfaction than 3 mg group.
**Conclusion(s):** When used as part of a multimodal analgesia regimen, 1 mg epidural morphine provided noninferior postcesarean analgesia and caused fewer adverse effects compared with 3 mg epidural morphine.
**Reference:**

Singh, S.; Rehou, S.; Marmai, K.; Jones, P. "The Efficacy of 2 Doses of Epidural Morphine for Postcesarean Delivery Analgesia: A Randomized"; Anesth Analg 2013;117:677-85.

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## 04AP08-11

### Analgesia for cesarean section: comparison between continuous wound infusion and i.v. analgesics

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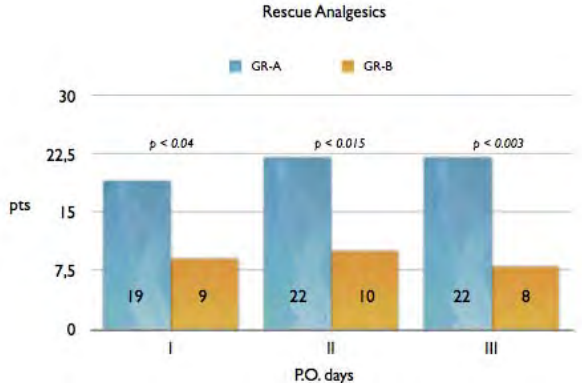
**Background and Goal of Study:** Postoperative pain in cesarean section is often a challenge for anesthesiologist, its inadequate control can prolong recovery and increase chronic pain.
The aim of this prospective, observational, randomized, case-control study was to assess the analgesic efficacy of two different methods to pain control after cesarean section.
**Materials and methods:** After approval of the local ethics committee, seventy women undergoing cesarean section were enrolled in the study, after the acquisition of written informed consent. Each patient underwent a spinal anesthesia (isobaric levobupivacaine 11 mg). Women were allocated by daily randomization into two groups. In GR-A (n= 37) patients were treated with i.v. elastomer (tramadol 400 mg, ketoprofen 400 mg, droperidol 2.5 mg and NS up to 100 ml, at 2 ml/h), in GR-B (n= 33) a continuous wound infusion catheter (levobupivacaine 0.125%, 250 ml, at 5 ml/h) was placed.
Primary outcome: average pain intensity at rest in postoperative (PO) 24 and 48 hours evaluated by NRS (Numeric Scale Ratio). Secondary outcomes: request for rescue analgesics in the three PO days, adverse events, time for the first self mobilization and length of hospital stay (LOS).
Statistical analyzes were performed using the t test or the Anova test for continuous variables, categorical variables were processed by the $Chi^2$ test or Fischer's exact test. A $p<0.05$ was considered statistically significant.
**Results and discussion:** Demographic aspects of women were not different between the two groups. The mean value of NRS in the postoperative 24 hours was 3.33 +/-1.7DS in GR-A and 2.37 +/-0.75DS in the GR-B, p= 0.004. In the 48 hours mean NRS was in the GR-A 3.08 +/-1.47DS and in GR-B 2.41 +/-1.24DS, p= 0.046. The request for rescue analgesics is described in the graphic. There were no significant differences in the two groups about adverse effects, first self mobilization and LOS.




*[Rescue Analgesics]*

**Conclusions:** Our experience has shown the superiority of continuous wound infusion in pain control after cesarean section. In the future may be of interest to assess the impact of this technique on the mother's ability to take care of their child.

## 04AP08-12

### Intrathecal morphine administration for spinal anesthesia for cesarean delivery

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**Background and Goal of Study:** Analgesia following cesarean delivery (CD) is optimally managed by administration of intrathecal morphine (IT-MO) during intrathecal medication injection. (1) In Israel, IT-MO is frequently not administered. (2) We investigated IT-MO administration for CD under spinal anesthesia in a two-center (community and tertiary medical center) Jerusalem institution.
**Materials and methods:** All CD from 02/2007 to 11/2015 were identified from an anesthesia information management system (AIMS) (Metavision, iMDsoft, Tel-Aviv, Israel). We identified all women who received spinal anesthesia including combined-spinal-epidural and conversion to general anesthesia. Using logistic regression we identified factors associated with IT-MO administration for spinal anesthesia.
**Results and discussion:** Within the study cohort, 10, 674 women had CD; 7, 686 (72%) received spinal anesthesia; IT-MO was used for 5, 909 (76.9%) women. In our multivariate model (Table), emergency surgery (aOR = 0.27; 95% CI = 0.25 - 0.29) was associated with decreased likelihood of IT-MO administration during spinal anesthesia for CD. CD in the tertiary center (aOR = 1.36, 95% CI = 1.25-1.48), and ASA 1 or 2 (aOR = 2.58; 95% CI = 1.91 - 3.49) were independently associated with increased likelihood of IT-MO administration during spinal anesthesia for CD.
**Conclusion(s):** In our study cohort, almost one-quarter of women who had spinal anesthesia for CD did not receive IT-MO. Emergency CD was associated with decreased likelihood of IT-MO administration. CD performed in the tertiary hospital and among ASA 1 and 2 were associated with increased likelihood of IT-MO administration.
Our analysis shows the utility of AIMS for quality improvement projects within multicenter medical institutions. A prospective quality improvement project should be performed to explore our finding of differences in IT-MO administration during spinal anesthesia for CD.
**Reference:**
1. Weiniger CF Isr Med Assoc J 2014;16:171-2 2. Orbach-Zinger S. Isr Med Assoc J 2014;16:153-6.

| | N (%) | aOR | 95% CI |
|---|---|---|---|
| Maternal weight | | | |
| Above 70 kg | 7963 (74.6%) | 0.97 | 0.89 - 1.07 |
| Below 70 kg | 2706 (25.4%) | | |
| ASA | | | |
| 1 or 2 | 10447 (97.9%) | 2.58 | 1.91 - 3.49 |
| 3 or greater | 222 (2.1%) | | |
| Cesarean delivery | | | |
| Elective | 5979 (56.0%) | 0.27 | 0.25 - 0.29 |
| Emergency | 4701 (44.0%) | | |
| Grade of Anesthesiology | | | |
| Attending | 5312 (49.7%) | 1.26 | 1.16 - 1.38 |
| Attending and resident | 1847 (17.3%) | | |
| Resident only | 3515 (32.9%) | | |
| Institution Hospital | | | |
| Community | 6620 (62.0%) | 1.36 | 1.25 - 1.48 |
| Tertiary | 4054 (38%) | | |
| Workshift | | | |
| Weekday | 9391 (88.0%) | 1.10 | 0.97 - 1.26 |
| Weekend | 1283 (12.0%) | | |

*[Table. Factors measured for association with intrathecal morphine administration for spinal anesthesia cesarean delivery]*

Key: aOR = adjusted Odds Ration; CI = confidence interval

## 04AP09-1

### Preferred techniques for obstetric anaesthesia and analgesia in Czech and Slovak Republic in the year 2015 - prospective observational survey

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**Background and Goal of Study:** In the year 2011 OBAAMA-CZ study described anaesthesiological practice for obstetric anaesthesia and analgesia in the Czech Republic. The aim of the OBAAMA-INT study performed in the year 2015 was to describe preferred techniques for the obstetric anaesthesia and analgesia both in the Czech (CZ) and Slovak Republics (SR).
**Materials and methods:** OBstetric Anaesthesia nad Analgesia Month Attributes International (OBAAMA-INT) was held on anaesthetic departments throughout the CZ and SR. With Ethical Committees Approval we aimed to enroll all 149 obstetric departments in CZ and SR and to monitor every case of anaesthetic care in peripartum period during November 2015. Data were recorded to Case Report Form with two parts (Demography 2014 and Case Report) into CLADE-IS (Masaryk University, CZ). The data were described descriptively. Fisher's exact test was used in case of categorical variables (SPSS 23, IBM).
**Results and discussion:** During the study period, we enrolled 105 participating centers (70 in CZ; 35 in SR) and 3 626 cases. At the time of statistical analysis 3040 were valid. Induced labour was recorded in 21.7 % (22.8% in 2011) cases, Caesarean Section (CS) rate was 24.0%; in CZ 21.6%, in SR 30.4% (24.3% in CZ in 2011). The most preferred type of anaesthesia for CS was neuraxial anaesthesia (62.9 %; 60.7% in CZ and 66.9% in SR (52.4% in CZ in 2011); spinal in 87.8 % (76.0% in 2011)). In case of General Anaesthesia (37.1 %) for CS, the predominant reason was urgency (50.0 %). Postoperative analgesia after CS was provided mostly with opioid or non-opioid analgesics (44.8 %; 63.1 %) solely or in combination.
There was significant difference (p = 0.014) in epidural analgesia rate (10.7 % overall; 12.1% in 2011) between large (>2000 deliveries per year; 18.2 %), intermediate (1000-2000; 7.9 %) and small (up to 1000; 7.9 %) centers. Labour analgesia administration was significantly more frequent in primiparas if compared to multiparas (p <0.001), in parturients with BMI <30 if compared to BMI >30 (p = 0.004) and in term births if compared to pre-term births (p <0.001).
**Conclusion:** Compare to previously published Czech national data, there is a positive trend in preference of neuraxial anaesthesia for CS, but simultaneously there is no progress in general availability of epidural analgesia for parturients in Czech Republic.
**Acknowledgement:**
*Financial support grant: CSARIM201501.*
*ClinicalTrials.gov ID: NCT02380586*

## 04AP09-2

### An audit cycle on written information for labour epidurals: are we offering it?

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**Background and Goal of Study:** Written information about epidural analgesia given during labour improves knowledge[1]. The Royal College of Anaesthetists suggest that 95% of women should be offered written information during labour[2].
Our goal was to assess how often women are offered this written information, implement changes aimed at improvement and then re-audit our practice.
**Material and methods:** We conducted a prospective audit on thirty consecutive women attending the Labour Ward in Barnet Hospital in May 2015. Responses to two questions were recorded: Were you offered written infor-

mation about labour epidurals during labour? Would this have been/was this useful?
Our initial audit showed that written information was not routinely being offered.
Laminated copies of the Obstetric Anaesthetists' Association Epidural Information card were placed in every Labour Ward suite. Further copies, including versions in the five most common foreign languages in our area, were made readily available. We also delivered an educational presentation to the department.
Using the same methodology, we re-audited our practice in November 2015.
**Results and discussion:** Our initial audit showed 3.3% of women were offered written information. 46.7% stated that they would have found it useful. Closing the loop, 70% of women were offered written information and 76% found it useful. Of those not offered written information, 50% said they would have found it useful. In both groups, pain was the most common reason for thinking the information would not be or was not useful (75% and 80% respectively).
**Conclusions:** Women were not routinely being offered written information about labour epidurals and many would have found it useful. After implementing changes, we greatly increased the number of women being offered written information. We showed that once women are offered the information cards, they find it more useful than we expected from the initial audit. Pain is the most common reason for limiting the usefulness of written information. We are looking at ways to improve consent by providing more information during the antenatal period.
**References:**
1. White LA, Gorton P, Wee MY et al. Written information about epidural analgesia for women in labour: did it improve knowledge? Int. J. Obstet. Anesth. 2003; 12(2):93-7
2. Colvin JR & Peden CJ. Raising the Standard: a compendium of audit recipes. Royal College of Anaesthetists. 2012. 3rd Edition. 208-9

## 04AP09-3

### Are pregnant women searching for information about epidural analgesia in labor on the Internet ?

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**Background and Goal of Study:** The use of the Internet to search for medical-related information is increasing and pregnant women seem particularly concerned by this phenomenon. To our knowledge, no study has assessed this phenomenon, therefore, the aim of this cross sectional study is to investigate the current use of the Internet by pregnant women for epidural analgesia information during labor (EAIL).
**Materials and methods:** Following institutional ethics approval, a 23-item questionnaire has been developed and distributed by the investigators in the post partum ward of our university hospital during three months between July and October 2015, and in three other French public and private maternity departments. Non French-speaking women and deliveries by caesarian were excluded. Socio-demographic characteristics and modalities of the Internet connection were collected.
The level of satisfaction of the information recovered by Internet was compared to the level of satisfaction of the information given by the anesthesiologist. Data were analyzed by Chi2 or Fisher's test.
**Results and discussion:** These preliminary results concern a single public university hospital.
Two hundred eighty-three (n = 94.3 %) of the 300 questionnaires were completed and analyzed. 24% (68/283) of pregnant women declared using the Internet to retrieve EAIL, whereas 86% (241/283) declared using the Internet to retrieve pregnancy related information.
Reasons why pregnant women declared not to use the Internet for EAIL were:
43% - already having sufficient information.
29% - a lack of confidence in Internet sources, and;
2% - the absence of Internet access.
In the group of women declaring use of the Internet to get EAIL, 75% of the questioned women declared using forums and 53% popular medical websites. None of the questioned women were aware of the certification label «Health On Net».
**Conclusions:** Our findings suggest that epidural analgesia is still not a popular subject of e-health during pregnancy, while healthcare professionals provide enough information in only 43 % of cases. It might prompt anesthesiologists to provide better information and to be aware of web site content on this topic, for example to advise a reliable website to primiparous pregnant women.

## 04AP09-4

### Quality improvement project in ‚obstetric follow up': pitfalls and problems

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**Background and Goals:** Follow up of Obstetric patients subjected to anaesthetic input is an essential part of the clinical role. This is all the more so because Obstetric practice is responsible for the majority of medical litigation in the UK. It is essential to assess post procedure pain/analgesia as well the neurological status in case of use of central neuraxial anaesthetic techniques. A 'Quality Improvement' project was designed at our local unit to look at this aspect of our practise.
**Materials and methods:** An initial survey was done in Jan 2015 (Nov 2014-Jan 2015) of the practice of 'follow up' of Obstetric patients. The results were discussed locally and problem areas identified. This resulted in the introduction of a standardised 'Follow up' label, designed by one of us. 6 months later, in Oct 2015 the survey was repeated.
**Results and discussion:** The initial survey sampled 127 patients, of which 76% had a recorded ‚free text' follow up. The most frequent fields recorded were the type and indication of anaesthetic technique. Less than 21% had any record of 'Neurological problems'. There were very few records of the ladies ambulating satisfactorily, returning bowel/bladder function, headaches (or lack of) or effectiveness of/satisfaction with the techniques.
The standardised (adhesive) label introduced was designed to cover all these areas.
The second survey (Aug-Sep 2015) discovered that the label had only been used in 55% of cases. In the remainder 45% where no label was used, 'free text' follow up was only recorded in 1:5 cases.
A survey of staff suggested that though a majority felt the 'label' was useful, it was seen as taking too much time.
**Conclusions:** There was no change in follow up rate of our Obstetric patients after the introduction of our 'intervention', suggesting that the reasons for the lack of follow up are more complex than originally thought. In fact, after the use of the labels, the 'follow up' recording rate declined.
We intend to look at this topic again- particularly at electronic/software based techniques. We also plan to introduce 'pre discharge' maternal satisfaction forms to capture information from those that leave within a few hours of delivery.

## 04AP09-5

### Relation between labour pain relief methods, postpartum depression, satisfaction with labour and labour analgesia for primiparous parturients

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**Background and Goal of Study:** Childbirth is associated with severe pain and intensive stress for most women. Women underestimate the pain of childbirth, especially primiparas. Unsatisfying birth experiences are associated with the occurrence of postpartum depression. Pain relieving during childbirth is not as significant in ensuring a positive birth experience, but labour analgesia may decrease postpartum depression by affecting the feeling of powerlessness.
Our primary objective was to assess the relation between labour analgesia, satisfaction with labour and labour analgesia and the postpartum depression.
**Materials and methods:** An observational prospective cohort study was carried at 2014 11 - 2015 09 in a teaching hospital. To evaluate the satisfaction the New Mother Quality of Care questionnaire (NEMOQC) was used. To estimate postpartum depression level Edinburgh Postnatal Depression Scale (EPDS) was used at <72 h and 4 weeks (contacted by phone) after birth.
**Results and discussion:** 264 primiparas after vaginal delivery fit the inclusion criteria. 245 were included, 19 didn't answer all questionnaires. The response rate was 92.8%. Epidural analgesia was used for 100 (40.8%) of parturients, 50 (20.4%) used nitrous oxide and 95 (38.8%) didn't use analgesia. Postpartum depression was in 10.2% (N=25) cases within 72 hours, and in 12.1% (N=29) 4 weeks after delivery.

| | N2O vs without analgesia | | | Epidural vs without analgesia | | |
|---|---|---|---|---|---|---|
| | OR | 95% CI | p | OR | 95% CI | p |
| **Satisfaction with labour analgesia** | 3,467 | 1,706-7,045 | 0,001 | 3,424 | 1,896-6,183 | <0,001 |
| **Satisfaction with labour** | 0,547 | 0,250-1,199 | 0,132 | 0,414 | 0,215-0,795 | 0,008 |
| **Postpartum depression <72 h** | 1,000 | 0,323-3,101 | 1,000 | 1,071 | 0,425-2,704 | 0,884 |
| **Postpartum depression after 4 weeks** | 1,272 | 0,644-2,512 | 0,489 | 0,155 | 0,052-0,253 | <0,001 |

*[The effect of labour analgesia methods on satisfac]*

There is no statistically significant association between satisfaction with labor and post-partum depression within 72 h.( $\chi^2 = 0.250$, p=0.617), and 4 weeks after delivery ($\chi^2 = 0.257$, p=0.612). There is no statistically significant association between satisfaction with labor analgesia and post-partum depression within 72 hours ($\chi^2 = 0.054$, p=0.816), but the association was statistically significant 4 weeks after delivery ($\chi^2 = 8.497$, p=0.004).

**Conclusion(s):** Satisfaction with labour analgesia is increased using nitrous oxide and epidural analgesia. Satisfaction with labour is better using epidural analgesia. According to EPDS, the postpartum depression rate might be reduced 4 weeks after delivery using the epidural analgesia. Satisfaction with labour analgesia reduces postpartum depression.

## 04AP09-6

### Local anaesthetic resistance in a parturient

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**Background:** Local anaesthetic resistance is a rare condition and difficult to diagnose. Reports of resistance to local anaesthetic are often attributed to failure of technique or medication. Local anaesthetic works via the sodium channels; theoretically atypical responses to local anaesthetics may be possible due to mutations in these channels [1].

**Case report:** A 32 year old healthy primiparous female with no problem during pregnancy, presented at 39+4 weeks gestation in active labour with 4cm cervical dilatation. A lumbar epidural was sited with 10mls of 1% lidocaine to achieve adequate skin analgesia. 20mls of 0.1% levobupivacaine with 2mcg/ml of fentanyl was administered initially, followed by two further boluses of 10mls of the low concentration pre-mixture with no obvious analgesic effect. 10mls of 0.25% levobupivacaine were administered with slight pain relief. An additional 15mls of 0.25% levobupivacaine provided adequate pain relief. The level of sensory blockade to cold was at T10 dermatome with no motor blockade. Labour pain relief was managed with patient-controlled epidural analgesia according to local protocol with intermittent clinician boluses of 0.25% levobupivacaine. Eventually, she had a normal vaginal delivery without any complications. Patient volunteered information of a previous problem with local anaesthetic for dental procedure, which was carried out despite inadequate pain relief with local anaesthetic injection.

**Discussion:** The convincing history and presentation make the diagnosis of local anaesthetic resistance very likely. A literature search has revealed isolated case reports of local anaesthetic resistance. One pilot study by Trescot evaluated the prevalence of local anaesthetic resistance to mepivacaine, lidocaine and bupivacaine [2]. Patients who complain of pain during procedures despite what appears to be adequate local infiltration need to be taken seriously and might benefit from assessment of their response to a different local anaesthetic.

**References:**

1. Ragsdale DS, McPhee JC, Scheuer T, Catterall WA: Molecular determinants of state-dependent block of Na+ channels by local anaesthetics. *Science* 1994, 265 (5179):1724-1728.
2. Trescot AM, Local anaesthetic “resistance”. *Pain Physician* 2003; 6:291-293

**Learning points:** Local anaesthetic resistance should be considered in patients with failed local anaesthetic action after excluding technical and medication failure. It may be due to genetic variations in sodium channels.

## 04AP09-7

### Features of anaesthesia for abdominal delivery in pregnant women with a transplanted kidney. Case report

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**Background:** Among people with a transplanted kidney are women of childbearing age. Maintenance of pregnancy, childbirth and the anesthesia management of such women has its own features. All women receive immunosuppressive therapy. A large number of co-morbidities(arterial hypertension, anemia, diabetes, graft dysfunction e.t.c.) require monitoring of several specialists during all pregnancy. Anesthesia should satisfy requirements: minimal effect on graft, hemodynamic stability, prevention of infectious complications, maintain graft function, rational infusion therapy.

**Case report:** Pregnant woman, 30 years old, second gestation(35-36 weeks), after kidney allotransplantation in 2001, anemia, chronic pyelonephritis of transplant, after bilateral nephrectomy in 2000. Comorbidities: chronic arterial hypertension, gastritis, obesity of 1st degree. During pregnancy has been observed by nephrologist, cardiologist, internist and surgeon. Immunosuppression was performed with ciclosporin and methylprednisolone. In last trimester blood pressure was 15090. The duration of operation was 40 minutes. View of anesthesia: low dose Combined Spinal-Epidural Anesthesia by needle through the needle. Administered intravenously: oxytocin 10ed, Amoksiclav 1,2g, solumedrol 250 mg. Infusion: 1200ml kristalloids, diuresis-50ml, blood loss 600ml. Stable hemodynamics. BP 114 / 60-140 / 78. Heart rate 86-92, Sat 97-99%. Vasopressors were not used. A girl was borned 8-9 at Apgar score. Postoperative course was normal. In pain management epidural component was used primarily.

**Discussion:** General anesthesia can be also used if regional is impossible.

**Reference:**

1. Thompson B.C., Kingdon E.J., Tuck S.M., et al. Pregnancy in renal transplant recipients: the Royal Free Hospital experience // Q.J.M. - 2003. - №96 (11). - P. 837-8442. Bar J., Fisch B., Wittenberg C., et al. Prednisone dosage and pregnancy outcome in renal allograft recipients // Nephrol. Dial. Transplant. - 1997. - №12 (4). - P. 760-763.3. Stratta P., Canavese C., Giacchino F. et al. Pregnancy in kidney transplantation: satisfactory outcomes and harsh realities // J. Nephrol. - 2003. - №16. - P. 792-806.

**Learning points:** Low dose CSEA is the treatment of choice at this kind of patients, because it has minimal effect on the graft , provides stable hemodynamics , it is effective and promotes early activation of the patient.

## 04AP09-8

### What would you do? Epidural analgesia in a rare skin condition

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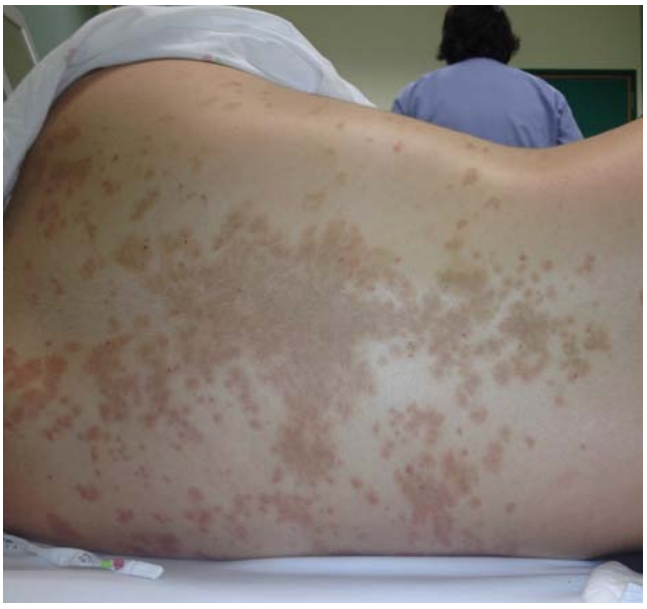
**Background:** *Gestational pemphigoid* (GP) is an autoimmune skin disorder occurring in about 1/50000 pregnancies[1]. It causes skin and mucosal blistering eruption and pruritus[1]. Reports on anaesthetic management of GP are sparse.

**Case report:** A 30 year-old pregnant diagnosed with GP presented with thorax, lower back and limbs macular and vesicle eruption and pruritus.
As pruritus and lesions were worsening, labor was induced at the 38th week of gestation. Anaesthesiolgy was called for pain control. Epidural analgesia (EA) was performed using ropivacaíne 0.2%. Despite lesions, there was a lesion free spot to insert the needle. No complications were reported.

**Discussion:** Anaesthetic approach was a challenge. Skin lesions or suspicion of skin infection frequently contraindicate EA. However, opioids must be avoided due to pruritus escalation and nitrous oxide is not available in our hospital. We found only one article reporting EA in a patient with GP. In our case there were no lesions in the patient’s back[2]. With such few reports in the literature, it was important to discuss the risks of EA with Dermatology and Obstetrics. Skin lesions could also be a problem for blood pressure, EKG monitoring[2,3] and adhesive use for catheter fixation. Literature reports that infiltration with local anesthetic has a risk of bullae formation and skin sloughing at injection site[3]. In this case existing lesions didn’t aggravate nor new lesions developed.



*[picture of the patient's thorax and lower back]*

Mucosa is typically less affected in GP but there are reports that airway manipulation can lead to bleeding, edema or new lesions formation in pemphigus and other pemphigoid conditions[2,3]. An epidural catheter also avoided intubation in case of caesarean section.

**References:**
1. Huilaja L. *et al*. Gestational pemphigoid. Orphanet Journal of rare diseases. 2014, 9:136
2. Eldor J, et al. Epidural analgesia for a parturient with herpes gestationis. Can J Anaesth 1990, 37:6, 678-9
3. Balsal A, et al. Anesthetic considerations in pemphigus vulgaris: Case series and review of literature. Saudi J Anaesth. 2012. 6:2 165-8

**Learning points:** Team work was crucial for managing this condition. EA benefits seems to overcome the risks in GP.

## 04AP09-9

### Our first results of fetoscopic surgery for spina bifida aperta

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**Background:** Certain life-threatening congenital malformations have the opportunity to be treated with minimally invasive fetal surgery. It has become an accepted treatment option for several fetal disorders. Fetoscopic surgery is mainly performed in the presence of congenital diaphragmatic hernia, cardiac malformations, neural tube defects, and twin-to-twin transfusion syndrome. A goal directed therapy is necessary for both maternal and fetal well-being. According to goal directed therapy, perioperative fluid, vasopressor and inotropic agent titration is recommended to be used taking into account the systemic and pulmonary vascular hemodynamics of patients as well as the pulmonary vascular permeability and fluid content. In this case series study we aimed to share our first results of 4 patients.
**Case report:** Following the written informed consents, data were analyzed for a total of 4 pregnancies (Table 1). All patients were 26 weeks pregnant undergoing minimally invasive fetal repair of spina bifida. Blood gas analysis with electrolytes, blood glucose levels, bispectral index, endtidal $CO_2$ pressure, mean arterial pressure, temperature, Global End Diastolic Volume Index, Pulse Contour Cardiac Index, Cardiac Index, Stroke Volume Index, Systemic Vascular Resistance Index, Global Ejection Fraction, Left Ventricular Contractility, Extra Vascular Lung Water Index, Pulmonary Vascular Permeability Index, Cardiac Power Index, Stroke Volume Variation, Pulse Pressure Variation, Central Venous Pressure and Peak Airway Pressure values were recorded 3 times during the perioperative period. (Table 2).
**Discussion:** Hemodynamic data did not show any statistically significant difference between preoperative and postoperative period in pregnant patients undergoing fetoscopic surgery for spina bifida aperta. There was no statistically significant difference in neither umbilical artery trace nor systolic or diastolic blood pressure rates. Anesthesia management in fetoscopic surgery involves optimal maintenance of hemodynamic monitoring. It is essential for the continuity of maternal and fetal well-being. Due to a detailed and reliable monitoring method, we concluded that ensuring the adequacy of the uteroplacental flow is closely related with optimal fluid therapy.
**Learning points:** Anesthesia management with hemodynamic monitorization, airway management and postoperative pain therapy are of key features in fetoscopic surgery.

## 04AP09-10

### A complete renal functional recovery from pregnancy-associated atypical hemolytic uremic syndrome

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**Background:** Atypical hemolytic uremic syndrome (aHUS) is one form of a thrombotic microangiopathy (TMA), characterized by hemolytic anemia, thrombocytopenia with platelets consumption, and acute kidney injury. aHUS is quite rare; however, it results in poor prognosis with irreversible loss of renal function in 33-40% of the patients, or even their death. We report a pregnancy-associated aHUS case with no sequela.
**Case report:** A 32-year-old healthy primigravida admitted to a general hospital with 36 weeks and 4 days gestation for delivery. After normal vaginal delivery, the patient developed atonic bleeding and underwent uterine artery embolism. The atonic bleeding was controlled, but the patient developed acute renal injury and needed continuous hemodiafiltration.
On postpartum day (PPD) 3, her blood test showed elevated lactate dehydrogenase, total bilirubin, liver enzymes, and low platelet count, therefore, the patient was transferred to our acute medical center.
The patient was diagnosed as TMA, so we performed plasma exchange (PE) therapy for two days. The laboratory data and clinical condition transiently improved, but they got worse on the third day after PE therapy. Thrombotic thrombocytopenic purpura was excluded by 65% of ADAMTS13 activity, and HUS was excluded by absence of Shiga toxin and anti-O157 antibody.
We diagnosed this case as aHUS and conducted another four days of PE. This improved her laboratory data once again, and her clinical condition was also gradually improved. On PPD 20, the platelet count reached to normal level, and renal replacement therapy was finished on PPD 30. The patient was discharged from the hospital on PPD51 without any sequela. The complement C3 mutation was found by gene analysis.
**Discussion:** Similar clinical presentation is observed in TMA (aHUS, TTP and HUS) and also in HELLP syndrome during peripartum period. aHUS is quite rare but critical as it indicates poor prognosis especially in renal function. Early diagnosis and prompt treatments are crucial for management of aHUS. In this case, PE was effective, and the patient avoided chronic renal function loss. Recently, it was reported that eculizumab improved outcome of patients with aHUS.
**Learning points:** Atypical HUS is a rare, but can induce renal function loss or even patients' death. Early diagnosis of aHUS and initiation of PE are crucial. If PE does not improve clinical condition, eclizumab administration can be considered.

## 04AP09-11

### Anaesthetic management of a parturient with pityriasis rosea: first report of an uneventful use of spinal anaesthesia

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**Background:** Pityriasis rosea is a disease of unknown etiology presenting with characteristic skin rash. It may impose challenges on anaesthetic management of labour and delivery as neuraxial techniques need a judicious approach. To our knowledge, there are no literature reports regarding neuraxial techniques in such cases. We report the first case of caesarean section under spinal anaesthesia in patient with pityriasis rosea.
**Case report:** 42-years-old woman was admitted to our unit at 37 weeks of gestation. In view of twin pregnancy she was scheduled to undergo an elective caesarean section. Two weeks before her admission she developed a pink, itchy, squamopapular rash over her trunk and back which was diagnosed to be pityriasis rosea. Differential diagnosis included pruritic urticarial papules and plaques of pregnancy (PUPPPs). After discussion between anaesthetists, obstetricians and dermatologists, a plan of regional anaesthesia was made. A single shot spinal with 2 ml of heavy bupivacaine 0.5% and 150 mcg of diamorphine was performed. The intra- and postoperative course was unremarkable and patient was discharged home after 48 hours.
**Discussion:** Pityriasis rosea is a dermatological condition presenting as a truncal rash. It is usually self-limiting and lasts for around 6-8 weeks. Exact etiology is unknown, but a viral causation such as human herpes HHV-6 is speculated. Prevalence during pregnancy is around 18% and complications described are premature delivery with neonatal hypotonia and fetal demise[1,2]. Diagnosis and management of dermatological conditions in parturients may represent a challenge for anaesthetists. We report for the first time an uneventful use of spinal anaesthesia in patient with an active pitiriasis rosea.
**Reference:**
1. Drago F et al. Pregnancy outcome in patients with pityriasis rosea. J Am Acad Dermatol 2008;58 (suppl 1):S78-S832. 2. Cruz MJ et al. Atypical pityriasis rosea in a pregnant woman: first report associating local herpes simplex virus 2 reactivation. The Journal of Dermatology 09/2011;39(5):490-2.
**Learning points:** Infection at the site of needle insertion is still considered a contraindication to neuraxial techniques. We suggest to reconsider the long-standing belief that regional techniques are contraindicated in patients with local skin infection, especially if it is not bacterial in nature, as in case of pityriasis rosea. However further reports are necessary to make definitive conclusions on the patients' safety.

# Paediatric Anaesthesiology

## 05AP01-1

### A comparison of the clinical performance of various types of supraglottic airway devices in children: a Bayesian network meta-analysis

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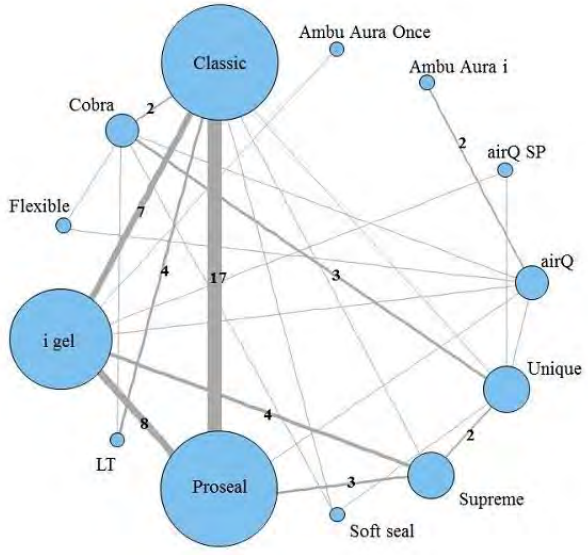
**Background:** Various types of supraglottic airway devices (SGAs) have been developed for children. To compare the clinical performance of SGAs in children, we conducted Bayesian network meta-analyses, which combined direct and indirect evidence to estimate the difference in the effect of and probabilities of ranking of SGAs.




*[Figure 1. Network graph of supraglottic airway devices*
*The size of nodes reflects the number of patients randomly assigned to each SGA. The thickness of edges represents the number of studies underlying each comparison]*

**The results of each outcome**

| | Oropharyngeal leak pressure | | | Failure at first attempt | | | Blood staining | | |
|---|---|---|---|---|---|---|---|---|---|
| | MD (95% CrI) (cmH2O) | ranking probabilities (%) | | OR (95%CrI) | ranking probabilities (%) | | OR (95% CrI) | ranking probabilities (%) | |
| Device | | Best 3 | Worst 3 | | Best 3 | Worst 3 | | Best 3 | Worst 3 |
| Classic | ref | 0.0 | 10.6 | ref | 0.1 | 13.0 | ref | 1.0 | 6.4 |
| LT | 6.9 (2.8, 11) | 30.5 | 0.0 | 0.82 (0.33, 2.04) | 1.5 | 8.4 | 0.63 (0.24, 1.55) | 15.0 | 2.3 |
| i-gel | 4.1 (2.3, 5.9) | 18.7 | 0.0 | 0.73 (0.41, 1.30) | 1.0 | 2.5 | 0.42 (0.19, 0.88) | 27.4 | 0.0 |
| Cobra | 4.1 (0.6, 7.5) | 17.8 | 0.0 | 0.99 (0.38, 2.63) | 0.2 | 13.4 | 1.05 (0.44, 2.54) | 2.2 | 10.5 |
| Soft seal | 2.9 (-2.9, 8.7) | 11.5 | 3.1 | 0.10 (0.00, 1.92) | 25.1 | 1.8 | 0.29 (0.01, 2.58) | 24.3 | 3.1 |
| Proseal | 3.6 (2.1, 5.1) | 11.0 | 0.0 | 0.88 (0.55, 1.37) | 0.4 | 7.3 | 1.27 (0.74, 2.19) | 0.4 | 18.6 |
| Ambu Aura Once | 1.1 (-5.5, 7.6) | 5.7 | 10.0 | 0.51 (0.09, 2.76) | 8.7 | 5.4 | 3.11 (0.32, 100.7) | 2.3 | 25.9 |
| Ambu Aura-i | 0 (-5.9, 6.1) | 2.5 | 13.8 | 0.11 (0.00, 6.71) | 23.5 | 4.3 | NA | NA | NA |
| air-Q | 1.1 (-2.7, 4.9) | 1.0 | 3.8 | 0.57 (0.06, 4.70) | 7.2 | 8.3 | NA | NA | NA |
| Supreme | 1.8 (-0.7, 4.3) | 0.7 | 0.9 | 1.00 (0.41, 2.6) | 0.5 | 14.2 | 0.79 (0.26, 2.39) | 8.7 | 6.4 |
| air-Q-SP | -1.5 (-6.5, 3.6) | 0.4 | 22.0 | 0.11 (0.00, 4.65) | 23.6 | 3.5 | 0.65 (0.01, 31.5) | 15.9 | 11.9 |
| Unique | 0.6 (-2.7, 3.8) | 0.2 | 6.2 | 0.51 (0.14, 1.74) | 6.1 | 2.2 | 1.17 (0.35, 3.37) | 2.7 | 15.0 |
| Flexible | -3.5 (-9.1, 2.3) | 0.1 | 29.4 | 1.02 (0.16, 6.68) | 2.3 | 15.7 | NA | NA | NA |

*[Figure 2]*

**Methods:** We searched MEDLINE, the Cochrane database, Embase, the Web of Science, and clinicaltrials.gov. RCTs comparing SGAs in children who underwent general anaesthesia were included. The primary endpoints were oropharyngeal leak pressure (OLP), insertion success/failure at first attempt, and blood staining on device.
The study quality was assessed using the Cochrane risk of bias tool. The pooled estimates of mean difference (MD) or odds ratio (OR) with corresponding 95% credible interval (CrI) were obtained using the Markov chain

Monte Carlo method. We performed sensitivity analyses after restricting to high quality RCTs.
**Results:** In total, 57 RCTs with 5035 participants were identified, including 13 types of SGAs (Fig 1). Laryngeal tube (LT), i-gel, Cobra, and Proseal LMA had a statistically significant difference on OLP than did LMA Classic (MD [95% CrI] = 6.9 [2.8, 11], 4.1 [2.3, 5.9], 4.1 [0.6, 7.5], 3.6 [2.1, 5.1], respectively). The effect of LT could not be confirmed by the sensitivity analysis because of lack of high quality RCTs for LT. Insertion failure at first attempt was similar in all devices. I-gel was the only device that significantly reduced the risk of blood staining on device compared to LMA Classic
(OR [95%CrI] = 0.42 [0.19, 0.88]) (Fig 2).
**Conclusions:** Considering beneficial and harmful effects, i-gel may be the best device. Although LT showed clinically meaningful difference on OLP compared to LMA Classic, the effect of LT should be examined in future trials with high methodological quality.

## 05AP01-2

### Correlation between tracheal tube size, ultrasound and age in pediatric patients

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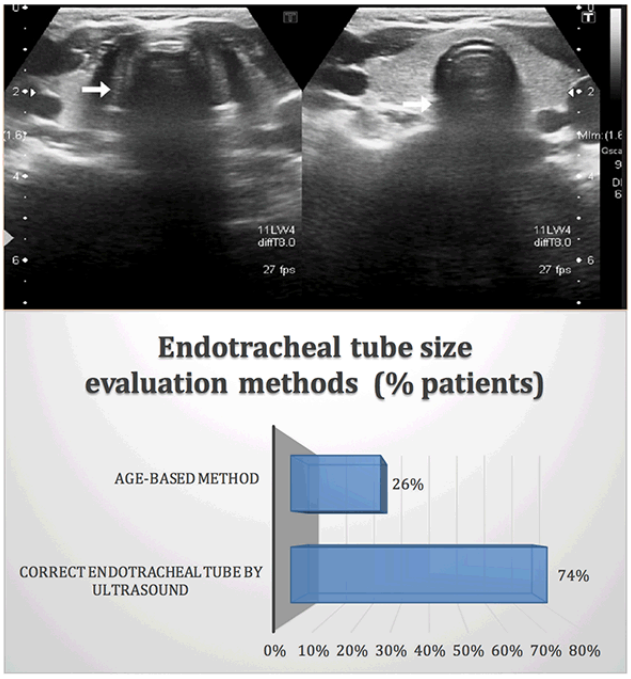
**Background and Goal of Study:** Tracheal intubation in pediatric patients presents problems concerning the identification of the correct size of the tube. An inadequate size lead to repeated intubations with high risk of airway damage, laryngospasm and dramatic desaturation, particularly in neonates and infants.The objective of our study was to assess whether ultrasound is useful for determining endotracheal tube (ET) sizes for pediatric patients.




*[Figure 1. Endotracheal tube size evaluation, comparison between age-based formula and ultrasound method. At the top the ultrasound image of airway and endotracheal tube correctly positioned]*

**Materials and methods:** A systematic multicentric review of our recorded data was analyzed. Fifty-six children, aged 1 - 8 years, that required tracheal intubation were enrolled for elective surgery. Tracheal tube sizes were selected using two methods: ultrasound or the conventional age-based formula. The ultrasound probe was positioned transversely on the trachea and inner tracheal diameters were measured at the level of the cricoid cartilage. The ET size was chosen with a diameters 0.5 mm smaller than that measured at the level of transverse cricoid diameter. Correct ET size was defined as the size that allowed an audible air leak around the tube under an airway pressure between 10 and 25 cm$H_2O$. All intubations were performed under general anesthesia (air/$O_2$/sevoflurane, fentanyl 2 mcg/kg, cisatracurium 0.15 mg/kg).
**Results and discussion:** The use of ultrasound allowed to determine the correct ET size in 74% of cases, whereas the age-based method enabled this in 26% of cases ($P<0.001$). The mean internal diameter of tubes selected by ultrasound was (5.8 ± 0.8 [4.0-6.5]) differed from that of tubes selected by conventional age-based formula (4.4 ± 0.7, [3.5-6.0]) ($P<0.001$). No complications were observed during the procedures (Figure 1).
**Conclusions:** The use of ultrasound allows us to more accurately calculate the size of the ET in children. This significantly reduces the risk of using a tube too large or too small compared to the age of the child. A wrong size tube forces us to perform reintubation exposing to the risk of airway damage, laryngospasm and bleeding. In addition, ultrasound allow to perform a post intubation check to ensure that the tube is correctly inserted.

## 05AP01-3

### Perioperative management of extremely low-birth weight infants underwent video-assisted thoracoscopic interruption of patent ductus arteriosus: VATS-PDA: 41 cases

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**Objective:** Associated with the rise in the survival rate of extremely-low-birth-weight infants(ELBWI) weighing under 1000g, there is an increasing number of cases with indomethacin resistant patent ductus arteriosus (PDA). For these infants, we performed video-assisted *thoracoscopic surgery* for patent *ductus arteriosus* (*VATS-PDA*). Since no report has been published regarding anesthesia for the infants, in the present study, we retrospectively studied perioperative management of ELBWI undergoing VATS-PDA.
**Methods:** With the approval of institutional ethical review board, forty-one ELBWI who received VATS-PDA from April 2005 to November 2014 were recruited. General anesthesia with sevoflurane and fentanyl were performed in all infants. Intraoperative changes in the blood pressure, heart rate, and $SpO_2$ and frequency of bradycardia were investigated. Data were expressed as mean±SD.
**Results:** Age of the infants was 24.1±7.5 days, body weight was 753.6±111.6 g, operative time was 28.7±8.2 minutes, and anesthesia time was 83.6±21.3 minutes. At the beginning of anesthesia, the arterial blood pressure was 45.0/25.0±9.6/8.2 mmHg, heart rate was 158.4±15.0 times/min and SpO2 was above 95%. Lowest intraoperative blood pressure was 33.0/19.5±7.5/3.9 mmHg, lowest heart rate was 129±32.0 times/min and lowest $SpO_2$ was 90.1±7.2%. During the surgery, 27 (65.7%) infants received atropine for bradycardia, and 5 (12.2%) infants received a vasopressor for low blood pressure. At the time of leaving the operating room, the blood pressure was 45.5/26.1±10.7/6.8mmHg, showing an increase in the diastolic blood pressure. All infants performed closure of PDA successfully, returned to the NICU and finally discharged after 130.9±74.2 days.
[Discussion] VATS-PDA is proved to be minimally invasive surgery applicable even for ELBWI with indomethacin resistant PDA. In the present study, frequent bradycardia was occurred requiring intravenous atropine administration. Also, during surgery when one lung ventilation was impossible, manual artificial ventilation was mandatory at the time of desaturation by the surgical compression of the lung.
**Conclusion:** Rapid therapy against bradycardia and hypoxia allowed the safe perioperative management of VATS-PDA in extremely low-birth weight infants.
**Reference:**
Pediatrics 1999;104:227-230 Video-Assisted Thoracoscopic Surgery for Patent Ductus Arteriosus in Low Birth Weight Neonates and Infants. Redmond P.Burke.

## 05AP01-4

### The efficiency of USG measurement and age related formula to determine the endotracheal tube diameter in pediatric patient

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**Background and Goal of Study:** Determination of the correct sized endotracheal tube (ETT) is frequently challenging. Although the age or height based formulas are used, repeated laryngoscopies may be necessary to obtain sufficient ventilation with the accurate size. In this study we aimed to compare efficiency of USG measurement and age based formula to determine the correct uncuffed endotracheal tube diameter according to established tube diameter in clinically.
**Materials and methods:** After the obtaining ethics comitee and parenteral informed consent. The patients from 2 to 10 years of age who were planned various type of surgeries were prospectivelly included this study. Exclusion criteries were patients weighted less than 10 kg or more than 50 kg and suspected airway abnormalities.
After the general anesthesia was induced with inhalation or intravenous way, the maintanance was provided with remifentanyl and sevoflurane with mask ventilation. Internal transverse diameter of cricoid level was measured with ultrasonography in B mode with a linear probe placed on the midline of the anterior neck after the cessation of the mask ventilation. The tube diameter was also calculatad with Cole formula and noted for same patient. The neuromuscular blocker was administered and patients were entubated with the best fit endotracheal tube in clinically. The endotracheal tube which was providing less than 30 ml leakage with the 25 cmH20 peak airway pressure and 6-8 ml/kg tidal volume during the ventilation was accepted the convienent diameter and size.
**Results:** The one hundred patients were enrolled the study. Mean age was 4.24±1.85 years. The mean diameter obtained with Cole formula were smaller than the clinically fitted endotracheal tube diameters. The mean cricoid diameter obtained with USG measurements were higher than the clinically fitted endotracheal tube diameters . Bland Altman analysis showed a mean bias of 0.71 mm with the limits of agreement (bias± 0.36 SD) 0.0012 to 1.42 for formula and a mean bias of 0.5 mm with limits of agreement (bias±0.73 SD) -0.93 to 1.93 for ultrasound.
**Conclusion:** Measuring cricoid diameter with ultrasonography may provide prediction of the best fit ETT size with 0.5 mm difference.

## 05AP01-5

### The emergency surgical airway in children: what is the plan?

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**Background and Goal of Study:** There is currently no evidence regarding the best technique for a paediatric emergency surgical airway. The aim of this study was to delineate best practice management of the emergency surgical airway for the paediatric “can’t intubate can’t ventilate” scenario.
**Materials and methods:** This systematic review included studies evaluating emergency paediatric surgical airway techniques, reporting one of the following outcomes: time to tracheal access, et$CO_2$ and/or effective ventilation, the success rate, complications and perceived ease of use of the different interventions. Because of the nature of the original studies it was not possible to perform a meta-analysis. Data was therefore reported as a S(trenghts), W(eaknesses), O(pportunities), T(hreats)-analysis of the respective techniques. Strengths and Weaknesses describe the techniques intrinsic (dis)advantages, while the opportunities and threats describe the (dis)advantage of the respective interventions during a paediatric can’t intubate, can’t ventilate scenario.
**Results and discussion:** The 5 studies that met our inclusion criteria described 4 different paediatric emergency airway techniques; catheter over needle, wire-guided, cannula or scalpel technique. Success vs. complication rates were 43% (10/23) vs. 34% (3/10), 100% (4/4) vs. 69% (11/16), 56% (87/154) vs. 36% (55/151) and 93% (43/46) vs. 38% (18/48) respectively. Mean time for placement was 43s (32-57) for catheter over needle, 60s (26-121) for cannula and 89s (71-128) for scalpel technique. No time was reported for the wire-guided technique. SWOT analysis indicates: catheter over needle: quick but high failure rate; wire-guided: high success rate but also high complication rate; cannula: less complications but high failure rate; scalpel: high success rate but longer procedural time. Regular training will improve success rates of all techniques.
**Conclusion:** Based on the current literature it is not possible to delineate best practice management for the paediatric emergency surgical airway in the “can’t intubate, can’t ventilate” scenario.

## 05AP01-6

### Laryngo-tracheo-esophageal cleft in a newborn - anesthetic management

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**Background:** A laryngo-tracheo-esophageal cleft (LC) is a uncommon congenital malformation, accounting for 0,5-1,5% of all congenital laryngeal abnormalities. Is characterized by an abnormal, posterior, sagittal communication between the larynx and the pharynx, possibly extending downward between trachea and esophagus. Five types have been described based on the downward extension of the cleft, which correlates with the severity of the symptoms. High prevalence of associated anomalies has been reported.
**Case report:** 24-day old male with a type III b LC diagnosed by a bronchoscopy in the context of a respiratory distress syndrome, with noninvasive ventilation since the birth and invasive ventilation since the 7th day. He was proposed for surgical correction by a multidisciplinary team. The presence of other congenital anomalies was excluded. The patient arrived to the operation room sedated and mechanically ventilated through an endotracheal tube. After induction of general anesthesia with sevoflurane, sufentanyl and cisatracurium, the surgery begun with a percutaneous endoscopic gastrostomy, followed by tracheostomy and closure of the laryngeal, tracheal and esophageal walls with an anterior approach. The surgery lasted for almost 5 hours and was uneventful, vital parameters were stable during the procedure and there was minimal blood loss. After the procedure the patient was transferred ventilated by tracheostomy to the neonatal intensive care unit.
**Discussion:** The mainstay of diagnosis is endoscopy and the treatment is highly dependent on the extent of the cleft and associated anomalies. It involves airway support and protection, endoscopic repair or open surgery. A type III b cleft extends through the cricoid cartilage and into the cervical trachea.
The pollution of the surgical field with halogenated anesthetics is a concern and a total intravenous anesthesia is an option. Regarding our lack of experience with TIVA in newborns, we opted for a balanced general anesthesia with sevoflurane and sufentanyl which is an effective, reliable, hemodynamic stable and safe option.
**Learning points:** A multidisciplinary approach during the perioperative period is essential in order to manage adequately the needs of these patients and to exclude other malformations usually associated
The main concerns for anesthesiologists are the unsecured airway, difficult ventilation and associated anomaliesFew case reports exists concerning the anesthetic approach to LC surgery.

## 05AP01-7

### How accurately can we measure tracheal length for preterm infant intubation?

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**Background and Goal of Study:** Tracheal intubation can be challenging in preterm infants with a high rate of endobronchial tube placement[1]. Tracheal length is unknown in this population. We measured tracheal length and diameter in a population of post mortem fetuses to define the relationship between gestational age and tracheal size, and to determine whether this could aid future tracheal tube selection and correct placement.

**Materials and methods:** Written informed consent was obtained for all patients for clinical pre-autopsy post-mortem magnetic resonance imaging (PMMRI) as part of our institution's clinical post mortem assessment. $T_2$ weighted isotropic PMMR sequences of the head and chest were retrospectively reconstructed into 3D multiplanar reconstruction datasets to identify the airway. We excluded cases in which the airway was either abnormal, or image quality was inadequate to permit measurements. We measured trachea length (defined as from mouth to carina; TL), oropharyngeal length (mouth to glottis; OL) and tracheal diameter (internal minimum luminal diameter; TD). Mid-tracheal length was calculated from TL and OL. Twenty random datasets were repeated to give a measure of intra-observer and inter-observer variability. Linear regression analysis was performed in SPSS.
**Results and discussion:** We reviewed 146 cases, of which 117 were analysed, from 15 to 42 weeks gestation with mean age 27.5 ± 8.3 weeks gestation. We found a good linear relationship between tracheal length and gestational age (TL = 0.275 GEST + 0.14; $R^2$ = 0.91), and mid-tracheal length (MTL) and gestational age (MTL = 0.226 GEST + 0.32; $R^2$ = 0.89). Tracheal diameter was more difficult to measure, particularly in extremely preterm and hence, smaller infants, with a consequent poorer linear relationship of TD = 0.009 GEST -0.05 ($R^2$ = 0.52).
**Conclusions:** Studies examining tracheal length in the paediatric population have largely focussed on term infants and children. This is the first large study investigating tracheal length in preterm infants. The linear relationship between TL, TD and gestation may aid in the correct selection and placement of appropriately sized endotracheal tubes in preterm infants, where age-based formulae are not applicable.
**Reference:**
1. Kemper M, Dullenkopf A, Schmidt AR, Gerber A, Weiss M. Nasotracheal intubation depth in paediatric patients. Br J Anaesth 2014; 113: 840-6.

## 05AP01-8

### Perioperative pain management in pediatric orthopaedic surgery

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**Background and Goal of Study:** Although regional anesthesia with neuraxial and peripheral blocks is a technique whose validity and safety has now been proven for some time, its use in pediatric surgery remains limited especially in Italy.
Our goal is to present results of a perioperative protocol in pediatric orthopedic surgery with patients aged between 5 and 14 years undergoing spinal anesthesia while under sedation and receiving a single-shot of US/ENS guided sciatic nerve block.
163 orthopedic surgery corrections of bilateral flat foot were performed between April 2012 and December 2015.
**Materials and methods:** Patients were 89 male and 74 female, ASA I, from 5 to14 years old.
Signed consent forms were collected from both parents during the pre-hospitalisation visit.
Patients were premedicated one hour before surgery with midazolam syrup 0.5mg/kg.
We monitored standard vital signs and made IV sedation with ketamine 2mg/kg, atropine 0.01mg/kg and midazolam 0.05mg/kg iv.
Patients received spinal anesthesia with levobupivacaine 0.3mg/kg, by US identifing L4/L5 level.
We performed the ENS/US-guided single shot sciatic nerve block (subgluteal approach) by using levobupivacaine 1.5mg/kg per side.
Surgery had an average duration of 15 min±10 per side.
Once a plaster cast was fitted total OR time was 90 min±15.
Before discharging we evaluated vital signs and level of sedation using the Scale of sedation (SS) with Bromage 3 and facial pain scale (FPS)0.
Postoperative pain was managed by acetaminophen 15mg/kg orally every 8 hours.
Rescue dose was set by Tramadol drops 1mg/kg (lock-out 3 times per day) and recording FPS at rest and in motion every 6 hours until discharge.
**Results and discussion:** Spinal anesthesia was successfully performed in all cases.
Only 1 child experienced a post-dural puncture headache lasting 4 days. It was treated with rehydration.
After surgery, the average FPS was 2 after 6 hours and 2.5 after 12 hours, while at discharge the average FPS was 1.1.
Five patients required pain treatment per os.
All patients were discharged on the third postoperative day.
**Conclusion:** Regional anesthesia through central and peripheral blocks was found to be a safe technique, with complications comparable to those seen in adults.
The reduction of surgical stress and control of analgesia using advanced techniques influenced the outcome in terms of length of stay.
We found also strong evidence of postoperative analgesia and lack of significant perioperative complications.

## 05AP01-9

### Critical incidents in paediatric anaesthesia: do the exist in Spain too?

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**Background and Goal of Study:** This study reports the Spanish experience in critical incidents (CI) observed in paediatric anaesthesia from January 2009 to July 2015.
**Materials and methods:** Since 2009, the Anaesthesia and Intensive Care National Incident Reporting System (SENSAR) - an organization that encompasses 86 Anaesthesia Departments all over Spain - has analyzed more than 5.000 critical incidents and suggested more than 9.900 corrective measures.
SENSAR collects data from a confidential, anonymous, voluntary and non-punitive online reporting system (ANESTIC). Reported incidents are analyzed by a team of local experts. Each team follows the Protocol for the Investigation and Analysis of Clinical Incidents' first published in 1999 by Vincent.
**Results and discussion:** From January 2009 till July 2015, a total of 154 CI in children up to 16 years old were reported. Most of the patients, accounting for 80% (122), were healthy ASA I or II children. 33% (51) of them took place in children under the age of 2.
Regarding the factors that may have contributed, we found that most CI were equipment failure related, 27% (42) were clinical incidents (of which 33% were respiratory events) and in third place (23 CI; 14%) we found medication errors.
Of 154 incidents, 55 of them (33%) resulted in consequences for the patient: 2,6% (4) accounted for major morbidity, 17% (27) for medium morbidity and 20 (12,9%) for low morbidity.
No deaths were reported. In 50% of the cases with major morbidity, corrective measures were adopted as a result of the incident reported. SENSAR's incident of paediatric reporting was 2,8%, which is similar to that reported in other international studies.
As our results also confirm, infants and neonates below one year of age have a higher risk of having a critical incident, reported to be 2.5 times that of older children. Only 25 hospitals (30% of the total enrolled) report paediatric incidents. The online database does not give any data regarding type of patients or care provided by each hospital; therefore, important information is missing to take further conclusions.
**Conclusions:** Paediatrics anaesthetists should be encouraged to take ownership and contribute high-quality descriptions of incidents to national systems. Althought the data base needs further improvement, it is a useful tool that provides insight in the healthcare system and enhances patient safety.

## 05AP01-10

### Effect of normovolemic haemodilution on evoked potential monitoring: an experimental observational study

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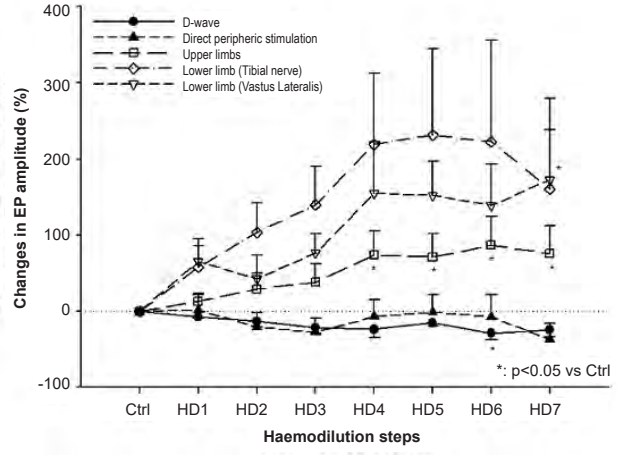
**Background and Goal of Study:** Normovolemic haemodilution (NH) is used as a blood transfusion sparing technique in both adults and children. However, there is little evidence about the potential harm on the Central Nervous System.

We assessed the acute effects of NH on the evoked potentials (EP) in piglets and pigs, in an attempt to identify any difference between a paediatric and an adult model.
**Materials and methods:** Anaesthetized, intubated pigs (n=8) and piglets (n=8) were submitted to stepwise 10ml/kg blood withdrawals, compensated with 30ml/kg of crystalloids. The latency and the amplitude of EP were measured at baseline and after each blood withdrawals, at the upper and lower limbs. Direct femoral nerve stimulations were performed. An epidural electrode was also used to register D-waves specifically. Heart rate, mean arterial pressure (MAP) and cardiac output (CO) determined by thermodilution (PiCCO), were recorded simultaneously.
**Results and discussion:** Parallel to the lowering in hematocrit level, heart rate increased similarly in both groups (up to 60%). Haemodynamic response was different between piglets and pigs, with MAP remaining stable and CO significantly increasing in piglets, while MAP decreased significantly with a fair stable CO in adult pigs. D-wave and peripheral direct stimulation signal amplitude changes had a slight tendency to decrease during haemodilution but not significantly in piglets (-24.4%±9.4(SE) and -37.3%±21.5) and in adult pigs (-26.8%±20(SE) and -28.4%±9.3 respectively).
In the amplitude of the motor responses (upper and lower limbs) a biphasic tendency was observed with an initial increase with decreasing Hct, followed by a decline at the onset of cardiovascular instability (Fig 1). Latency showed no statistically significant changes.
There was no significant correlation between the changes in EP amplitude and Hct changes.




*[Fig 1:EP amplitude changes during NH in piglets]*

**Conclusion(s):** Given the lack of correlation with the decrease in Hct, we can postulate that NH exhibit a minimal effect on the evoked potentials under stable haemodynamic conditions, with no evidence for detrimental effect on the neural conduction in the usual clinical range.

## 05AP02-1

### Ultrasound-guided sub costal transversus abdominis plane block for hypertrophic pyloric stenosis in infants

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**Background and Goal of Study:** hypertrophic pyloric stenosis (HPS) is one of the most common surgical condition in infants. The standard of care for its management is a surgical pyloromyotomy, which may proceed only when fluid balance, acid-base status and electrolyte levels have been restored to normal. Usually performed under general anesthesia with paraumbilical block for circumbilical incisions, we report our experience in ultrasound-guided sub costal transversus abdominis plane block (SCTAPB) for perioperative pain management of HPS repair through right upper quadrant (RUQ) surgical approach.
**Materials and methods:** Forty infants were included in this prospective observational study over a 3 years period (10/2013 to 03/2015). After removing the nasogastric tube, general anesthesia was induced with propofol without opioids & maintained with sevoflurane in a mixture (AIR/O2). After securing the upper airway with an endotracheal tube, infants were placed in supine position, a linear probe was placed at the right costal margin & an in plane sub costal transversus abdominis plane block (SCTAPB) was performed by injecting 0,3ml/kg of a 0;2% bupivacaine.
Intra operative pain was evaluated using PRST scale (each 5 min), than in post operative using FLACC scale (each 4 hours) during 24 hours. We also evaluated the feasibility of early oral feeding (six hours after anesthesia recovery). In case of intraoperative insufficient analgesia we used intravenous (IV) alfentanil (0.01 mg /kg). In post operative all patients received IV paracetamol (7,5 mg/kg each 6 hours) during 24 hours.
**Results and discussion:** Mean age was 32 days and average weight was 3050g. Only four patients (10%) needed inta operative alfentanyl, but no one needed additional analgesia in the post operative period. Early oral feeding was delayed for nine patients (22,5%) because of post operative vomiting.
**Conclusion(s):** SCTAPB decreases intraoperative opioids use & provides good post operative pain relief in infants undergoing pyloromyotomy through RUQ approach for HPS.

## 05AP02-2

### Comparison of caudal bupivacaine alone with bupivacaine plus two doses of dexmedetomidine for postoperative analgesia in pediatric patients undergoing infra-umbilical surgery: a randomized controlled double-blinded study

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**Background and Goal of Study:** Data are still insufficient about the effects of different concentrations of caudal dexmedetomidine when used to prolong postoperative analgesia in children. The aim of this study was to assess the analgesic efficacy and side effects of two doses of caudal dexmedetomidine (1 and 2 lgkg1) co-administered with bupivacaine in terms of postoperative pain scores and requirement of postoperative analgesia over 24 h in children undergoing infra-umbilical surgery.
**Materials and methods:** Ninety-one children, aged 1-6 years, undergoing infra-umbilical surgery were included and randomly allocated into three groups of caudal block. Group B received 0.25% bupivacaine 2 mgkg1 (0.8 mlkg1). Groups BD1 and BD2 received dexmedetomidine 1 and 2 lgkg1, respectively along with bupivacaine 2 mgkg1 in a total volume of 0.8 mlkg1. Anesthesia was induced and maintained with sevoflurane in 100% oxygen. Hemodynamic and other routine intraoperative monitoring was carried out in addition to endtidal sevoflurane concentration. Time to spontaneous eye opening and postoperative pain and sedation scores were recorded in addition to time to first analgesia, paracetamol analgesic requirements, and any side effects during the first 24 postoperative hours.
**Results and discussion:** Time to first analgesia requirement was significantly longer in BD1 and BD2 groups compared to B group with mean values (95% CI) of 809 min (652-965), 880 (733-1026), and 396 (343-448), respectively, P <0.001. Postoperative paracetamol analgesic requirements over 24 h were higher in group B compared to BD1 and BD2 groups (Mean (95% CI): 3.2 (2.9-3.5) doses, 1.9 (1.5-2.3), and 1.6 (1.3-1.9), respectively), P <0.001. The dexmedetomidine groups had significantly higher postoperative sedation-scores compared to plain bupivacaine group that were dose dependent and for longer time in BD2 group. Two patients in BD2 group developed bradycardia and hypotension, and one developed urine retention compared to none in other groups.
**Conclusion(s):** A 1 lgkg1 dose of caudal dexmedetomidine achieved comparable prolongation of postoperative analgesia to 2 lgkg1 dose, with shorter duration of postoperative sedation and lower incidence of other side effects.

## 05AP02-3

### Analgesic efficacy of caudal dexamethasone combined with bupivacaine in ilioinguinal pediatric surgery: prospective randomized controlled trial

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**Background and Goal of Study:** The aim of the study was to assess the efficacy of caudal dexamethasone with bupivacaine 0.25% for postoperative pain relief in children undergoing sub-umbilical surgical procedures.
**Materials and methods:** In this prospective randomized double blind study, 56 children of ASA-I class aged from 1 to 5 years scheduled for sub-umbilical surgical procedures were randomly allocated to two groups:
- group I received caudal block with: bupivacaine 0.25% (1 ml/kg) with placebo
- group II received caudal block with: bupivacaine 0.25% (1 ml/kg) with dewamethasone 0.1 mg/ml.
Postoperatively patients were assessed for analgesia and side effects.
**Results and discussion:** Demographic parameters (age, weight, size, sex) and per operative heart rate and blood pressure were similar in both groups. Significantly high levels and prolonged duration of post-operative analgesia was observed from the 6th to the 24th post operative hours in group II ($P<0.005$) with no increased side effects.
**Conclusion:** Caudal dexamethasone may safely improve and prolongs post operative analgesia for sub-umblical surgical procedures in children.

## 05AP02-4

### Caudal clonidine for pain relief in children undergoing sub-umbilical surgery: a randomized prospective trial

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**Background and Goal of Study:** The aim of the study was to assess the efficacy of clonidine when associated to fentanyl as additives to bupivacaine 0.25% given via single shot caudal epidural in pediatric patients for postoperative pain relief.
**Materials and methods:** In the present prospective randomized double blind study, 80 children of ASA-I class aged from 1 to 5 years scheduled for sub-umbilical surgical procedures were randomly allocated to two groups:
- **group I** received caudal block with **:** bupivacaine 0.25% (1 ml/kg) with fentanyl 1 $\mu$g/kg and clonidine 1$\mu$g/kg in
- **group II** received caudal block with : bupivacaine 0.25% (1 ml/kg) with fentanyl 1 $\mu$g/kg and placebo (normal saline)
Postoperatively patients were assessed for analgesia and side effects.
**Results and discussion:** Demographic parameters (age, weight, size, sex) were similar in both groups. Significantly high levels and prolonged duration of post-operative analgesia was observed from the $6^{th}$ to the $24^{th}$ post operative hours in group I ($P<0.0001$) with increased incidence of post operative motor blockade ($p=0.044$).
**Conclusion:** The adjunction of clonidine to fentanyl as additives to bupivacaine 0.25% in single shot caudal epidural in children may improve and prolong post operative analgesia for sub-umblical surgical procedures.
**Keywords:** Caudal epidural, clonidine, fentanyl, adjuvants, pediatric, postoperative analgesia.

## 05AP02-5

### Intravenous lidocaine as an adjunct to thoraco-lumbar paravertebral block for open appendectomy in children

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**Background and Goal of Study:** Intravenous lidocaine can cause visceral analgesia and reduce opioid requirements during and after abdominal surgery.
**Materials and methods:** Twenty-one 3 to 7 year old children with acute appendicitis were randomized into 2 groups (lidocain "L", n=11 and control C"", n=10) before open appendectomy. Intravenous induction and maintenance of anaesthesia with propofol (3 mg/kg and 6 mg/kg*hour, respectively), single-shot right side thoraco-lumbar paravertebral block (PVB) at T12-L1 level (bupivacaine 0.25%, 0.3 ml/kg) under local anaesthesia and neurostimulation guidance were performed in all children. In all children of "L" group intravenous lidocaine 30 minutes before surgery was administered (1.5 mg/kg bolus followed with 1.5 mg/kg*hour infusion until surgery was over). If there was motor or hemodynamic response to surgical stimulation, fentanyl boluses 1 mcg/kg were used in both groups until movements or tachycardia/hypertension disappeared.
**Results and discussion:** Postoperative opioid dose, NSAIDs dose and pain scores (FLACC scale or Wong-Baker scale) did not differ between groups. Intraoperative fentanyl dose was significantly lower in "L" group compared to "C" group (0.4±0.009 mcg/kg vs 1.8±0.011 mcg/kg respectively, P=0.012). Number of postoperative respiratory depression episodes did not differ between groups (0 vs 1 respectively, P=0.48). Postoperative sedation was deeper in "C" group compared to "L" group. Ramsay sedation scores postoperativly were in "L" group: in 0 min - 3.9±0.9**; in10 min - 2.7±0.7**; in 20 min - 1.7±0.5*; in 30 min - 1±0.3; in 60 min -1±0.1; and in "C" group: 5.1±0.8; 4.1±0.4; 3.3±0.6; 1.6±0.2; 1±0.08, respectively.
(** - P<0.01; * - P<0.05 compared to "C" group). Children of "L" group were discharged from recovery room earlier compared to children of "C" group, but the difference did not reach statistical significance (19.5±7.9 vs 28.7±9.8 minutes respectively, P=0.067). Incidence of postoperative nausea/vomiting (PONV) was lower in "L" group compared to "C" group (0 vs 4 respectively, P=0.035).
**Conclusion(s):** Intraoperative intravenous lidocaine infusion in addition to thoraco-lumbar PVB for appendectomy in children leads to significant intraoperative fentanyl dose reduction and reduces the incidence of opioid-related adverse events, such as excessive postoperative sedation, delayed recovery room discharge and PONV.

## 05AP02-6

### Infraclavicular block in a preterm neonate with congenital amputation

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**Background:** Brachial plexus blockade is a well-established technique in upper-limb surgery and can be performed by various approaches in children. Nevertheless, there is no much experience about the infraclavicular block in preterm neonates.
**Case report:** We present the case of a preterm infant (30 weeks, twin pregnancy), female, and very low birth weight (1.47 kg) with congenital amputation (radial and ulnar hemimelia). She also developed a respiratory distress syndrome due to hyaline membrane disease treated with supplementary oxygen. As aplasia/hypoplasia is usually associated with congenital diseases, a complete examination (cardiac, abdominal and cranial ultrasound) was performed; the only finding was a patent foramen ovale. Because of exposure of the distal end of the radius, a reamputation and skin closure were considered. The baby had gradually gained weight to 1.8 kg and at day 21, the surgery was planned. After explaining to the parents the benefits of regional anaesthesia in the preemie, avoiding general anaesthesia, the informed consent was obtained.
Following application of routine monitors, intravenous midazolam and ketamine were administered for sedation. The infant was placed in supine position with the shoulder abducted and the arm placed along the body. The ultrasound probe (MicroMaxx, Sonosite, L25 probe) was placed just above the coracoid process, the axillary artery and the vein were identified, and an echogenic needle (Stimuplex®, Braun) was placed in an in-plane approach. An ultrasound-guided single shot block with 0.9 mL (0.5mL/kg) of 0.25% bupivacaine was performed. The sedation was maintained with 2% sevoflurane thru nasal prongs, and oxygen supplementation. The preterm remained well sedated, with no movement of the upper extremity limb. She was discharged in the neonatal unit, and the recovery was uneventful.
**Discussion:** Ultrasound visualization enabled us to perform the block under real-time image, avoiding accidental arterial punctures and intravascular injections (known during blind techniques). Regional anaesthesia prevents complications of general anaesthesia as neurotoxicity, cardiovascular collapse, or postoperative apneas.

**Learning points:** In preterm neonates with low weight, regional anaesthesia can be performed under expert hands, thus avoiding general anaesthesia. Infraclavicular block is a feasible option in the intraoperative management of neonatal congenital amputation.

## 05AP02-7

### A prospective observational audit to determine the incidence and etiology for earlier than planned discontinuation of epidural analgesia and breakthrough pain in children

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**Introduction:** Continuous Epidural Analgesia (CEA) is an effective method to provide post-operative analgesia with high patient satisfaction. Clinical benefits in pediatric patients include decreased length of hospital stay and reduced requirement for PICU admission. CEA is often left in place for about 3 days post-op. In adults a failure rate of 22% has been reported, most commonly due to catheter dislodgement. The incidence and cause of failure is less well-described in the pediatric population. We prospectively sought to determine the incidence and causes of epidural failure at our institution.
**Methods:** After ethics approval, we recruited cognitively intact patients who received CEA for post-operative pain control at the Hospital for Sick Children during the 2014 and 2015 calendar years. A total of 81 patients were recruited and data prospectively collected. Patients ranged from newborn to 18 years and underwent orthopedic, urologic or general surgery. Inclusion criteria required ongoing CEA on arrival to the ward after PACU discharge. Primary outcome was CEA discontinued earlier than planned. Secondary outcomes included duration of CEA use, incidence of breakthrough pain, incidence of moderate or severe pain, catheter disconnect and catheter leak.
**Results:** Our study population included 27 females (38%), 52 males (62%), range of 2 months to 18 years (mean 8.9 years) and a weight range of 4.4 to 63.8 kg (mean 29.4 kg). Results are reported in Table 1.

| | |
|---|---|
| Duration of epidural use (days) | 3.09 +/-0.95 |
| Prematurely terminated epidural - for any reason (nr) | 15/80 (19%) |
| Prematurely terminated epidural - due to poor pain control (nr) | 9/80 (11%) |
| Inadequate analgesia - breakthrough pain or muscle spasm (nr) | 47/79 (60%) |
| Documented episode of moderate pain (>4/10) (nr) | 27/75 (36%) |
| Documented episode of severe pain (>7/10) (nr) | 16/75 (21%) |
| Patients who received morphine (nr) | 63/79 (80%) |
| Catheter disconnect from filter (nr) | 3/79 (4%) |
| Catheter leak at puncture site (nr) | 19/79 (24%) |
| Inadequate analgesia in those with a catheter leak (nr) | 17/19 (89%) |

*[Table 1 - Results]*

**Discussion:** Prematurely discontinued pediatric epidural rate (19%) is similar to the adult population (22%). Pain is the main reason (60%) for discontinuation with 80% of all patients receiving opiates. Catheter leak at the puncture site (24%) is higher than in adults and correlates with inadequate analgesia (89%), possibly due to anesthesia solution leakage.
Further investigation is needed to determine if needle size, number of attempts, catheter depth in the epidural space and using a skin sealant may improve pain outcome.

## 05AP02-9

### Comparison of transversus abdominus plane block with two different doses of levobupivacaine for postoperative pain management in pediatric patients

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**Background and goal of the study:** Transversus abdominus plane(TAP) block is a simple, effective and reliable method in postoperative pain management following lower abdominal procedures(1). The aim of the current study is to investigate the effects of two different doses of levobupivacaine in TAP block for postoperative management and to evaluate whether we can achieve effective pain management with lower dose than the recommended dose of Levobupivacaine.
**Materials and methods:** Fifty patients aged between 2-12, undergoing unilateral inguinal surgery were included to the current randomized, controlled study which was registered in clinicaltrials.gov as NCT02567487. The patients were randomized to Group C(Control) (TAP block with levobupivacaine 0.25%, 0.5 ml/kg) and Group LD(low dose) (TAP block with levobupivacaine 0.25%, 0.25 ml/kg). Following routine monitorization and achieving sufficient anesthesia depth with sevoflurane, ultrasound-guided TAP block was performed to all patients. Hemodynamic parameters were recorded during intraoperative period. The pain intensity [visual analogue scale (VAS), observer pain scale (OPS) and faces scale], recovery profile (Modified Aldrete Recovery Score) and patient satisfaction were evaluated postoperatively. Peripheral nerve block complications (permanent nerve damage, hematoma, intraabdominal organ punction, local anesthetic toxicity) and side effects (nausea-vomiting) were recorded during postoperative period. Paracetamol and ibuprofen were administered when VAS score ≥4. Total doses of rescue analgesics were recorded.
**Results and discussion:** No significant difference was found between groups in terms of age, gender and duration of surgery ($p>0.05$). There was no significant difference between groups in terms of VAS, OPS, faces scale, the time of first analgesic requirement, total amount of analgesic consumption and patient satisfaction($p>0.05$). No complications and side effects were observed.
**Conclusion:** Ultrasound-guided TAP block with dose of 0.25 ml/kg levobupivacaine 0.25% was found to be effective and reliable in pediatric patients. Thus it is recommended for TAP Block in pediatric patients in whom toxicity is the most important problem.
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## 05AP02-10

### Does planned pain management improve the experience for children undergoing orthopedic surgery?

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**Background and Goal of Study:** We report the results of our recently adopted team approach to pediatric orthopedics which includes coordination of the anesthesiologist, orthopedic surgeon and the post operative pain management team. The aim of our IRB approved study was to improve pain control, reduce patient and parental anxiety, decrease family disruption and do so in a cost effective manner.
**Materials and methods:** 48 out of the 53 children undergoing lower extremity orthopedic procedures had an ultrasound guided single shot regional nerve block administered after induction of anesthesia. 5 children had indwelling catheters. The single shot block consisted of 1/4% Marcaine with EPI (2.5-4mg/kg). Decadron 2-8 mg was added in order to extend the duration of the block.
Pertinent perioperative clinical data was recorded and at 24 hrs post op the parents, and when applicable the patient, were asked to fill out a satisfaction survey.

**Results and discussion:** 53 patients underwent 9 soft tissue procedures, 21 bony procedures and 23 had combined bony and soft tissue procedures. Of these, 26 were males and 27 females. Ages ranged from 22 months to 22 yrs with an average age of 10 years. Weight varied from 9.7-89 kgs with an average of 41 kgs. The regional procedures consisted of femoral, popliteal, saphenous blocks or a combination as clinically indicated. 5 patients had catheters. 40/48 of the children who had a single shot were discharged home in the care of their parents. No child required readmission for pain control. The children admitted were for long bone osteotomies, acute fractures which required neurovascular monitoring or treatment of comorbidities.
The results of the patient survey showed that both parents and children were satisfied with pain relief 3.8 and 3.6/4. The reported anxiety over future procedures was rated low at 1.3 and 1.5/5 for parent and children respectively.
**Conclusion(s):** Our results show that a majority of children undergoing lower extremity orthopedic procedures can be sent home with effective pain control and minimal family disruption. We feel that the addition of Decadron helped us achieve this goal.
More importantly, from an economic point of view, the cost of a 71 cent vial of Decadron saved 3600 dollars/admission in hospital costs (at our facility). In addition an overnight admission, that was not wanted by families or needed for routine care, was avoided.

## 05AP02-11

### Population pharmacokinetics of oxycodone in neonates and infants

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**Background and Goal of Study:** The pharmacokinetics of oxycodone (OXY) have been studied in neonates, children and adolescent (1-3).
However, PK of OXY in neonates and infants less than six months has not been established. Here we have built a population PK model of OXY in neonates and infants.
**Materials and methods:** Data on single iv OXY 0.1 mg/kg administration was used from a new, optimally designed study (n=77).
In addition, published data from infants receiving OXY iv (n=33) or im (n=10) were used.
A two-compartmental model was applied to describe the time-concentration data. CL was predicted as a function of postmenstrual age and body weight, centered to a median patient of 4 kg.
Based on this data we simulated a loading dose of OXY and subsequent individualized doses to keep the average plasma concentration of OXY between 10 and 50 ng/ml that is an assumed analgesic concentration.
**Results and discussion:** A good agreement between the observations and model predictions was obtained. Typical values of PK parameters were calculated for four virtual patients.
CL was lowest in extremely preterm neonate (PMA 187 days, 0.5 kg), 0.36 l $h^{-1}$ $kg^{-1}$, compared to older preterm (246 days, 2.2 kg), 0.44 l $h^{-1}$ $kg^{-1}$, term newborn (281 days, 3.5 kg), 0.51 l $h^{-1}$ $kg^{-1}$, and older infant (644 days, 10 kg), 0.86 l $h^{-1}$ $kg^{-1}$.
$VD_{ss}$ was highest in extremely preterm neonate, 4.1 l/kg, compared to older preterm, 3.1 l/kg, term newborn, 2.9 l/kg, and older infant, 2.4 l/kg.
Based on the simulations the individualized iv OXY doses to be given every 4 h were 45 $\mu$g/kg for extremely preterm neonate, 50-65 $\mu$g/kg for older preterm and term newborns, and 100 $\mu$g/kg for term newborn.
Because of the large random between-subject variability, individual dose titration and close monitoring of patients is warranted, and these dosage regimens obtained by simulations should be considered as preliminary proposals before further efficacy and safety data are available. The safety of repeated OXY doses in infants has not been established.
**Conclusion:** Decreased CL and increased interindividual variability of OXY CL was quantified for neonates.
Close follow-up for efficacy and safety is warranted when opioid analgesics are administered in these age groups.
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## 05AP03-1

### Predictors of prolonged hospital stay and unplanned admission in paediatric ambulatory surgery: a retrospective study

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**Background:** Recently, paediatric ambulatory surgery has become common; however, 1.8-2.2% of children undergoing ambulatory surgery experience an unplanned admission. The aim of this study was to identify the predictors of prolonged hospital stay and unplanned admission in paediatric ambulatory surgery using multivariate analysis.
**Methods:** Data were obtained retrospectively from the medical and anaesthetic records of 1,087 consecutive patients aged <18 years who underwent ambulatory surgery under general anaesthesia. We defined ‚prolonged hospital stay' as hospitalisation for >8 h after end of anaesthesia. Logistic regression was used to examine associations between the independent variable (i.e. prolonged hospital stay) and 14 parameters including patients, anaesthesia, and operative factors. A forward stepwise procedure was used to select the final regression model, which was determined by selecting the model with the lowest Akaike's information criterion value for each step.
**Results:** The incidence of prolonged hospital stay was 6.6% (72 of 1,087 patients). Multivariate analysis identified ASA-PS, type of regional block, intraoperative fluid volume, duration of operation, and type of surgery as predictors of prolonged hospital stay. Out of these, the following factors were identified as strong predictors: caudal block as compared to no regional block (odds ratio [OR] = 0.38 [95% confidence interval {CI}, 0.18-0.82]); increasing intraoperative fluid volume (OR = 0.62 [95% CI, 0.41-0.95 for every increment of 10 mL/kg]); increasing duration of operation (OR = 1.17 [95% CI, 1.05-1.29 for every increment of 10 minutes]); and Ear, Nose, and Throat (ENT) and urology surgery as compared to general surgery (OR = 0.14 [95% CI, 0.03-0.67] and OR = 4.48 [95% CI, 2.30-8.72], respectively) (Table.1).
**Conclusion:** This study revealed that prolonged hospital stay and unplanned admission in paediatric ambulatory surgery was affected by type of regional block, intraoperative fluid volume, duration of operation, type of surgery and ASA-PS. Our results suggested that regional analgesia or supplemental intraoperative fluid may prevent prolonged hospital stay and unplanned admission.

| | odds ratio | 95% CI | p value |
|---|---|---|---|
| ASA | 1.79 | 0.99 - 3.25 | 0.055 |
| Type of nerve block (vs no block) | | | |
| PNB | 0.62 | 0.30 - 1.27 | 0.191 |
| Caudal | 0.38 | 0.18 - 0.82 | 0.013 |
| Intraoperative fluid volume (10 ml/kg) | 0.62 | 0.41 - 0.95 | 0.029 |
| Duration of operation (10 min) | 1.17 | 1.05 - 1.29 | 0.003 |
| Type of surgery (vs general surgery) | | | |
| ENT surgery | 0.14 | 0.03 - 0.67 | 0.014 |
| Urological surgery | 4.48 | 2.30 - 8.72 | 0.00001 |

*[Table.1. Predictors of prolonged hospital stay and unplanned admission in the final model]*

## 05AP03-2

### Dexamethasone combined with ondansetron is more effective than with droperidol against nausea and vomiting after pediatric tonsillectomy. A randomized, double-blind trial

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**Background and Goal of Study:** Rate of postoperative nausea and vomiting varies between 40 and 75% in children. Dexamethasone, ondansetron and droperidol are effective antiemetic drugs that have never been investigated when administered in combination.
This randomized, double-blind trial tested the hypothesis that the combination of dexamethasone with droperidol is as effective as the combination of dexamethasone with ondansetron for the prophylaxis of nausea and vomiting after pediatric tonsillectomy.
**Materials and methods:** Three hundred children scheduled for bilateral tonsillectomy with or without adenoidectomy were randomized into three groups according to an intravenous regimen administered after induction of anaesthesia: Group D received dexamethasone (250 mcg/kg); Group DD received dexamethasone (250 mcg/kg) and droperidol (10 mcg/kg); Group DO received dexamethasone (250 mcg/kg) and ondansetron (150 mcg/kg). The primary outcome was the rate of postoperative nausea and vomiting on postanaesthetic care unit. Secondary outcomes included rates of side effects such as hemorrhage, extrapyramidal syndrome or somnolence.
**Results and discussion:** The rate of postoperative nausea and vomiting on postanaesthetic care unit was significantly reduced in Group DO (Group D = 44%, Group DD = 36%, Group DO = 9%; p<0.0001). There were no differences in the rates of side-effects between groups.
**Conclusion(s):** Based on our results, we conclude that the combination of dexamethasone with ondansetron is more effective than the combination of dexamethasone with droperidol for the prophylaxis of nausea and vomiting after pediatric tonsillectomy.

## 05AP03-3

### Steward Simplified Post-Anaesthetic Recovery Score can predict negative postoperative behavioural changes (NPOBC) in children after discharge from the hospital; Croatian prospective cohort study

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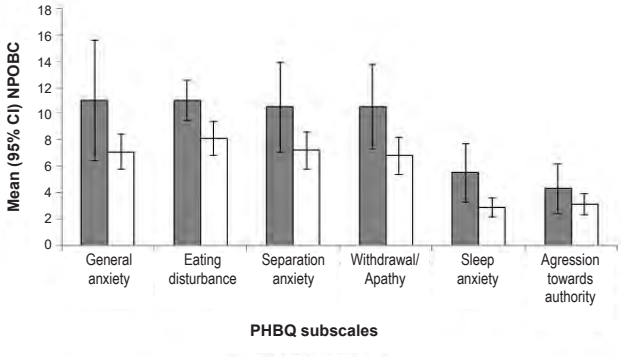
**Background and Goal of Study:** NPOBC after surgery and general anaesthesia occur in 50% of children. They can affect emotional and cognitive development, therefore it is important to identify children at higher risk of NPOBC as early as possible.
Steward Score is a simple tool for assessment of three factors indicating postanaesthetic recovery in children: consciousness, airway and movement. It is routinely administered during the post-surgery recovery period. The goal of this study was to verify whether NPOBC may be predicted by Steward Score.
**Materials and methods:** This prospective cohort study was done at University Hospital Split on the sample of 64 children (48% of them female) undergoing elective adenotonsillectomy, anesthesized by sevoflurane or total intravenous anaesthesia with propofol. Children median (interquartile range) age was 7 (6.0-9.8) years. Stewards Score was measured on admission at 5, 15, 30 min and at discharge. Post Hospitalization Behavioural Questionnaire (PHBQ) was administered by parents the day after the surgery.
**Results and discussion:** After adjustment for age, sex, type of anaesthesia and body mass index, children's consciousness measured by Steward Score 30 min after the surgery was statistically significant, independently associated with general anxiety. (P=0.028), sleep anxiety (P=0.047), and withdrawal (p=0.040). It was not significantly associated with separation anxiety (P=0.08), aggression towards authority (p=0.079) and eating disturbances (p=.138).




*[Figure 1]*

Negative postoperative behavioural changes (NPOBC) measured by Post Hospitalization Behaviour Questionnaire (PHBQ) by children consciousness 30 min after the surgery measured by Steward Simplified Post-Anaesthetic Recovery Score; dark bars represent children who are not fully awake, white bars represent fully awake children; error bars represent 95% confidence intervals in children's consciousness.
**Conclusion:** Consciousness 30 min after the surgery measured by Steward Score can be used as an early indication of higher risk of NPOBC.
**Reference:**
Steward DJ.A simplified scoring system for the post-operative recovery room Can Anaesth Soc J. 1975 Jan;22(1):111-3.

## 05AP03-4

### Predictors of postoperative oxygen therapy in children who underwent non-cardiac surgery under general anesthesia

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**Background and Goal of Study:** Postoperative oxygen therapy in children is not only related to postoperative hypoxemia but also related to other factors during anesthesia which has never been investigated. The objectives of this study were to determine predictors of oxygen devices needed and mechanical ventilation required postoperatively in children who underwent non-cardiac surgery under general anesthesia.
**Materials and methods:** This was a cross sectional study of a prospective study of Oofuvong's regarding perioperative respiratory event in children. We recruited children aged <15 years assigned ASA physical status I-III who scheduled for non-cardiac surgery and underwent general anesthesia between November 2012 and December 2013 at Songklanagarind Hospital. Demographic, surgical and anesthesia related data were recorded. The association between oxygen devices and mechanical ventilation needed postoperatively and potential predictors were determined by ANOVA and Chi-square test. The multivariate polytomous logistic regression analysis was performed to identify independent predictors of oxygen devices and mechanical ventilation needed postoperatively. The relative risk ratios and 95% confidence interval (CI) were displayed and considered significant if p-value were <0.05.
**Results and discussion:** We included 1334 children in the study. Incidences of postoperative oxygen devices and mechanical ventilation needed were 4.05% and 2.32%. After adjusted relative risk ratio and 95% CI by ASA physical status, predictors for postoperative oxygen devices and mechanical ventilation needed were similar which were low BMI (<15 kg/m2, p <0.05), thoracic surgery compared to eye surgery (p<0.01)), longer anesthetic time (p<0.05) and having intraoperative and PACU respiratory events (p<0.001). Postoperative oxygen devices needed was significantly associated with longer PACU time (68.4+29.6 vs 54.2+30.4 minutes, p=0.004), longer days of hospitalization (7.3+9.2 vs 3.1+4.7 days, p<0.001) and higher hospital charges (38,522+42,343 vs 25,885+57,063 baths).
**Conclusion(s):** To reduce perioperative respiratory event might decrease days of hospitalization and hospital charge related to postoperative oxygen therapy in pediatric anesthesia.
**Reference:**
Siddiqui N, Arzola C, Teresi J, Fox G, Guerina L, Friedman Z. Predictors of desaturation in the postoperative anesthesia care unit. Journal of Clinical Anesthesia 2013; 25:612-17

## 05AP03-5

### The effects of oral gabapentin premedication on the incidence of postoperative nausea and vomiting and early postoperative recovery profile in paediatric patients undergoing adenotonsillectomy

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**Background and Goal of Study:** Current evidence suggests that gabapentin reduces the incidence of postoperative nausea and vomiting (PONV) in adults.The antiemetic potentials of gabapentin in paediatric patients were not systematically investigated before. This double-blind, randomised, controlled study was designed to explore the effects of oral gabapentin premedication on the incidence of PONV, on children behavior during inhalation induction of anaesthesia, and on the early recovery profile of paediatric patients undergoing adenotonsillectomy in the day surgery unit.
**Materials and methods:** The study included140patients(3-12 years) randomised to receive oral gabapentin 16 mg/kg (n=70) or placebo (n=70) as premedication; 2 h before anaesthesia. All patients received a standard anaesthetic including:sevoflurane, fentanyl 1$\mu$g/kg, and rectal acetaminophen 30 mg/kg. Patients were breathing spontaneously.The Paediatric Anaesthesia Behaviour score (PAB) was used to assess patients acceptance of inhalation induction. The following parameters were recorded by a blinded investigator over the 6 h study period: time to extubation and interaction, composite incidence of PONV, incidence of emergence agitation (EA) using Cole and Paediatric Anaesthesia Emergence Delirium (PAED)scores, Objective pain scale(OPS),and the time to first request to postoperative analgesia. Primary outcome of the study is the incidence of PONV. The trial was registered in the Clinical Trials.gov (NCT02384187).
**Results and discussion:** Patients characteristics were comparable in the two groups. The incidence of PONV was 13%in gabapentin group compared to 28% in the control, (p 0.03). Relative risk reduction, absolute risk reduction, and the number needed to treat for PONV were 0.55, 0.16, and 6, respectively. The incidence of EA was lower at all times assessment points during the first hour postoperatively in gabapentin group.PAB score during inhalation induction, time to extubation and interaction, OPS, and time to first request to rescue postoperative analgesia were comparable in the two groups. Gabapentin use was not associated with any observed side effects.
**Conclusion(s):** The use of oral gabapentin premedication in paediatric patients undergoing adenotonsillectomies under sevoflurane anaesthesia reduces the incidence of PONV and EA in the early postoperative period. However gabapentin does not appear to have postoperative analgesic effects in this patient population.

## 05AP03-6

### The influence of preoperative emotional and behavioral problems of children on postoperative emergence delirium after dental care

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**Background and Goal of the Study:** Psychologic factors such as state anxiety, temperament and preoperative behavior may be important risk factors related to emergence delirium (ED) in children (1, 2). Aim of the study: to test the influence of preoperative emotional/behavioral problems during 6 months prior to surgery on ED.
**Materials and methods:** After IRB approval, a prospective cohort study was carried out.
Inclusion: eligible were all consecutive children between 1.5 and 12 years old undergoing dental care in daytime surgery, ASA 1&2, Dutch speaking parents.
Exclusion: children with mental retardation.
All children received a standardized anesthesia protocol (inhalation induction and maintenance with sevoflurane) and pain management (including fentanyl, dexamethasone and paracetamol).
Predictor variables:
1. children's emotional/behavioral functioning was assessed by parents on the Child Behavior Checklist (CBCL), using raw and T scores on, Internalizing (intrapsychic) and Externalizing (conflicts with others);
2. children's state anxiety as measured by the modified Yale Preoperative Anxiety Scale (mYPAS);
3. parental anxiety was measured by Spielberger's State-Trait Inventory (STAI);
4. age of the child.
Outcome variable: sum scores of the Pediatric Anesthesia Emergence Delirium scale (PAED) to assess ED during the first 20 postoperative minutes. Pearson correlations matrix and multiple linear regression were used to test if CBCL scores were associated with higher PAED scores.
**Results and discussion:** The cohort included 107 children (45 % girls; mean age 68.5 months, SD ± 19.7). Univariate analysis showed significant associations between the child's age (r = -.22; = .023), PAED sum scores and Externalizing scores (r = .22; *P* = .022) respectively. Multivariate analysis (using T scores) also showed that the child's age and Externalizing behavior were significant independent predictors of ED (*P* = .035).
**Conclusion:** Preoperative existing emotional/behavioral problems predicted ED in children undergoing dental care in daytime surgery.
**References:**
1. Dahmani S, Mantz J, Veyckemans F. Anesthesiology. 2012;117(2):399-406.
2. Berghmans JM, Poley M, Weber et al. Minerva Anestesiol. 2015;81(2):145-56.

## 05AP03-7

### The additional structured behavior observation, a new tool to assess emergence delirium in children after surgery

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**Background and Goal of the Study:** The Pediatric Anesthesia Emergence Delirium (PAED) scale is considered the golden standard to assess children's emergence delirium (ED). The aim of this study is to validate a new scale to assess postoperative ED in children taking into account certain signs in eyes and movement (1,2).
**Materials and methods:** After IRB approval, a prospective cohort study was carried out as part of an ongoing study investigating ED after anesthesia dental care.
Instruments:
a. the new short Additional Structured Behavior Observation (ASBO) consists of 5 items: 1. purposeful handling; 2. eyes averted or stare; 3. no reaction to stimuli (verbal, tactile); 4. the child is aware of its surroundings; 5. the child is consolable. Each question can be answered by yes or no (score range 0 - 5);
b. the PAED scale to assess ED. Both scales were measured by trained observers at 5 min, 10 min, 15 min and at 20 min after awaking.
Statistics:
a. concurrent validity between ASBO and PAED were computed (Spearman rank correlation);
b. discriminant validity: receiver operating characteristic (ROC) curve was calculated to determine a cut-off score to assess ED with ASBO, with as reference a PAED score > 12;
c. construct validity: calculate the trend of the ASBO scores over time (Friedman's rank test).
**Results and discussion:** The cohort included 107 children (45 % girls) with mean age of 68.5 (months), SD ± 19.7. The correlations between ASBO and PAED scores (r = .83; *P* <.0001) are strong. ROC analysis for ASBO (area under the curve [AUC] = .93; [95% CI: .91-.95], *P* <.0001) showed a score of > 1 on the ASBO to assess ED. Using this cut-off, the sensitivity was 89.6% and the specificity 86.1%. Decreased ASBO scores over time confirmed construct validity (*P* = .002).
**Conclusion:** This new ASBO is a new easy to use, valid and clinically relevant tool to assess ED in children after surgery.
**References:**
1. Sikich N, Lerman J. Anesthesiology. 2004;100(5):1138-45.
2. Malarbi S, Stargatt R, Howard K, Davidson A. Paediatric anaesthesia. 2011;21(9):942-50

## 05AP03-8

### Establishment of a scoring system for predicting emergence agitation after general anaesthesia in children

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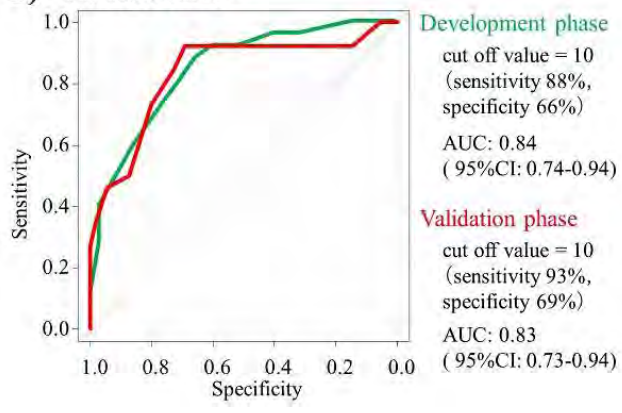
**Background:** Emergence agitation (EA) is a common complication of general anaesthesia in children. Estimating the risk of EA in children is essential for developing a strategy for its prevention. However, reliable predictive methods have not been established. The aim of this study was to develop an EA risk score by performing a two-phase (development and validation phases) study.
**Methods:** The data from 120 children aged 1.5-8 years who were enrolled in our previous randomized controlled trial and who were anaesthetized with sevoflurane was used for the development phase. By using logistic regression analysis with Akaike information criterion stepwise selection, we determined the best predictive model for EA. The scores of the selected predictors were determined using their odds ratio, and the EA risk score was calculated by summing them. In the validation phase, we prospectively enrolled 81 children aged 1.5-8 years scheduled to undergo general anaesthesia with sevoflurane. We assessed the incidence of EA using a PAED scale. We examined the predictive ability of the EA risk score by generating a receiver operating characteristic (ROC) curve for both development and validation phases. We calculated the area under the curve (AUC) of the ROC as well as the sensitivity and specificity at the best cut-off point.
**Results:** The EA risk score ranged 0-23 points and included factors such as age, preoperative behaviour score, surgical procedures, and anaesthesia time (Fig. 1A). In the development phase, the AUC was 0.84 (95%CI: 0.74-0.94) and the best cut-off point was 10 (sensitivity: 88%, specificity: 66%). In the validation phase, the AUC was 0.83 (95%CI: 0.73-0.94) and the best cut-off point was 10 (sensitivity: 93%, specificity: 69%) (Fig. 1B). The similar results between the different set of patients indicated the validity of the EA risk score.
**Conclusion:** We established and validated the EA risk score for children, with relatively high accuracy. We consider that the EA risk score is useful not only for predicting EA in clinical settings but also for stratifying the EA risk in future studies focused on patients with high (or low) risk of EA.

**A) The EA risk score**

| | Score |
|---|---|
| **Age (year)** | 9 − Age |
| **Operative procedure** | |
| Strabismus surgery | 7 |
| Adenoidectomy or tonsillectomy | 7 |
| Others | 0 |
| **Preoperative behavior score** | |
| Screaming or shouting | 4 |
| Tearful and/or withdrawn but compliant with induction | 2 |
| Calm and controlled | 0 |
| **Anaesthesia time** | |
| > 2 hours | 4 |
| 1 to 2 hours | 2 |
| < 1 hour | 0 |
| **Total** = | **The EA risk score** |

**B) The ROC curve**




*[Figure 1]*

## 05AP03-9

### Emergence agitation incidence and related factors in the general postoperative recovery room

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**Background and Goal of Study:** Emergence agitation (EA) is a well-known clinical phenomenon with no definitive explanation. The reported prevalence of EA ranging from 10 to 80%. There are many unconvinced causes related to EA. Our aim is to determine and discuss the incidence and possible risk factors for postoperative agitation in our institution's general postoperative recovery room in the light of the literature.
**Materials and methods:** After Ethic Committee Approval was obtained patients who were transported to postoperative recovery room (PORR) after having operation under general and/or regional anesthesia between 09.15.2014-03.15.2015 were evaluated in terms EA. EA was defined as Richmond Agitation Scale ≤ 2. Age-gender-surgery-anesthesia type-chosen anesthetics-pain level-haemodynamic variables are traced. The Student's *t*-test was used to compare the mean value of quantitative data between pediatric and adult patient. Nonparametric data were compared between the pediatric and adult groups with the Mann-Whitney U test. Categorical data such as the incidence of EA and the other parameter were compared by the chi-squared test and expressed as a number or percentage. A P value of $<0.05$ was considered statistically significant in all tests.
**Results and discussion:** Total 7659 patient were evaluated in Gazi University Gazi Research and Education Hospital's PORR and 299 patients experienced EA [(Operation room:case number/EA case number (emergency agitation %):Urology 944/19 (2.01), Plastic and Reconstructive Surg.792/20 (2.52), Orthopedic Surg. 1375/40 (2.90), ENT Surg. 1158/35 (3.02), Gynecology and Obstetrics Surg. 477/16(3.35), General Surg. 1355/55 (4.05), Neurosurgery 385/19 (4.90), Eye Surg. 616/37 (6.00), Pediatric Surg. 558/58 (10.3)].There was a significant difference in the incidence of emergence agitation (EA) between pediatric age group and adults ($p \leq 0.05$).
**Conclusion(s):** No single factor can be identified as the cause of postoperative agitation. It seems that EA is mostly related individual properties more than anesthetic choses and pain control. According to our observation patient's temperament characteristics and emotion regulation properties may be related defining the EA. We need sensitive and specific tools to accurately differentiate the contributing factors and definition of EA.

**References:**

Isik B et al.Paediatr Anaesth. 2008;18(6):494-500
Isik B et al.Paediatr Anaesth. 2008;18(7):635-41.
Isik B et al.Eur J Anaesthesiol. 2010;27(4):336-40.

## 05AP03-10

### The complication incidence of anesthesia practice during MRI in pediatric patients

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**Background and Goal of Study:** Anesthesia is often employed for Magnetic Resonance Imaging (MRI) for pediatric patients. Despite the presence of an anesthetist, complications may occur during anesthesia out-of-operating room[1], and considering that MRI environment is different compared to the safety of the operating theatre, it is crucial to anticipate the common complications and be prepared to manage them properly. We aimed to investigate types and incidence of complications during anesthesia practice in MRI.
**Materials and methods:** The anesthesia records of pediatric patients undergoing MRI under anesthesia between January-June 2015 were analyzed. The complication incidence was the primary outcome parameter. The types of complications, the interventions to manage them, comorbidities, the types and doses of anesthetic agents, as well as the correlation between these parameters were analyzed as secondary outcome parameters. Complications were analyzed by using descriptive statistics. A p-value $<0.05$ was considered significant.
**Results and discussion:** 122 patients' records were reviewed. The complication incidence was 6.6%; including desaturation, bradycardia and loss of airway patency. These complications were managed successfully by using various techniques with respect to type of complication; including airway opening maneuvers, oral airway placement, LMA insertion and medical therapies. 119

patients had at least one comorbidity. 118 patients received 0.1 (0.02-1.1) mg/kg midazolam, 120 received 2.1 (0.5-6.2) mg/kg propofol and 6 received 0.6 (0.4-0.8) mg/kg ketamine. 121 patients received propofol infusion at a rate of 5 (3.0-10.0) mg/kg/h. The durations of sedation and recovery were 29.4±9.2 min. and 24±9.5 min., respectively. The incidence of complications has no correlation with either durations. In a study comparing the complication incidences of different anesthesia providers, the incidence pertained to anesthetists was reported 7.8% . Our patients' anesthesia were all provided by an experienced anesthetist; revealing a similar complication incidence of 6.6%.
**Conclusion(s):** Complications may occur during anesthesia for MRI; despite the presence of an experienced anesthesia team. Since, MRI suitable equipment may not be as familiar as the ones in the operating room; being aware of such complications is crucial to anticipate and also to be prepared for using the equipment properly.
**Reference:**
1. Coloures KG, et al. Pediatrics 2011; 127(5): 1154-60

## 05AP03-11

### Postoperative complications in scoliosis surgery: what can we learn?

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**Background and Goal of Study:** Surgery for scoliosis repair (SSR) has become a common procedure in the pediatric group. Postoperative complications (PC) can occur and in some medical centers patients are admitted to the intensive care unit (ICU). The goal of our study was to establish possible associations between pre and perioperative parameters and PC in pediatric patients submitted to SSR.
**Materials and methods:** Retrospective analysis in our tertiary center. We reviewed clinical records of all patient <18 years submitted to a SSR between January 2012 and December 2014. PC were divided in neurologic (motor or sensory deficits) respiratory (respiratory distress, pneumonia, atelectasis or pneumothorax) hematologic (continuous bleeding and need pos-operative transfusions, coagulations abnormalities) and hemodynamic (need postoperative vasopressors or clinical parameters of low organ perfusion). Descriptive analyses of variables were used to summarize data and Chi-square, Mann-Whitney, t-Student and exact Fishers tests were performed ($p<0.05$).
**Results and discussion:** SSR were performed in 99 patients. 13 patients were excluded due a lack in electronic data. PC occurred in 16 patients (18.6%). PC were not related to gender ($p= 0.215$), type of scoliosis ($p=0.093$) and hemoglobin value prior to surgery ($p=0.396$). PC were associated with younger patients ($p=0.002$), ASA physical status >3 ($p=0.04$), associated comorbities ($p=0.023$) and weight percentil <25% ($p<0.0001$). Longer surgeries ($p<0.001$), blood losses > 25% of estimated blood volume (EBV) ($p<0.0001$), need of transfusion ($p=0.009$) and high levels fused ($p=0.001$) were related to an increased incidence of PC. PC were more frequent in patients admitted in intensive care unit (UCI) ($p=0.04$) and related to longer admissions ($p<0.0001$).
**Conclusion(s):** SSR has a varying but high rate of complications with some studies reporting PC rates as high as 48% and others 14%. In our study PC were related with patient and surgery factors so so its important, when possible, optimize both.
Younger adolescents with low deformities requiring less levels fusion, with no associated morbidities and weight percentile> 25% can probably be managed in a regular recovery room.
**Reference:**
Pediatric Anesthesia 23 (2013), 271-277

## 05AP04-1

### Ultrasound guided brachiocephalic vein catheterisation for central vascular access in children

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**Background and Goal of Study:** Ultrasound guided central venous catheters(CVC) are usually inserted through internal jugular (IJV) or subclavian vein (SCV) to deliver drugs, nutrition or chemotherapy into superior vena cava (SVC).
We report our experience in ultrasound guided short & long term central venous placement through brachio cephalic vein in children.
**Materials and methods:** 80 children schedueled for CVC placement were included in this prospective observational study over a 10 months period (october 2014 to July 2015). Ultrasound guided supraclavicular in plane puncture of the wright or left BCV was performed under general anesthesia (sevoflurane). We reported: success rate , number of punctures, incidents, complications and overall time procedure.
**Results and discussion:** 20 Short stay CVC & 60 totally implantable venous access devices (TIVAD) were placed.mean age was 5,57 year, & average weight was 17kg.Successful puncture was achieved in 93 ,7%, (5 failure : 3 conversion intio IJV & 2 impossible punctures):in 73,4% at first attempt, 20% at second attempt and 6,6%at third attempt. Mean time of procedure was 14 minutes for short stay CVC and 24,7 minutes for TIVAD. No pneumothorax neither arterial puncture were noted.
**Conclusion(s):** Ultrasound guided BCV approach represents an interesting alternative to IJV & SCV for SVC catheterisation. Tangential direction of needle insertion to the pleura and the absence of clavicule acoustic shadow are the main advantages of this technique.

## 05AP04-2

### Effects of varying entry points and Trendelenburg positioning degrees in internal jugular vein area measurements of newborns weighing between 3000-3500 grams

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**Background and Goal of Study:** Internal juguler vein (IJV) cannulation in pediatric patients is a technically difficult procedure, carrying a high risk of complication (1). Recent guidelines from the National Institute for Clinical Excellence (NICE) recommend the use of ultrasonography in central venous catheterization of children. In this study we aimed to compare area measurements across varying Trendelenburg degrees, for two different entry points used as IJV cannulation points in newborns.
**Materials and methods:** Fifty-eight healthy newborns, between 3000-3500 grams, were recruited for this prospective study. Right IJV consecutive measurements were made in 3 different Trendelenburg positions at 0, 15, and 30 degrees, at two different entry points: the conventional approach and an inferior approach. The landmark used in the conventional approach was the top of the triangle formed by the two heads of the sternocleidomastoid muscle with the clavicle; whilst in the inferior approach, it was taken as the midpoint of the clavicle, as measured from the upper edge of the clavicle.
**Results and discussion:** The cross-sectional area (CSA) of the RIJV was significantly increased when using the inferior approach, compared to that in the conventional approach, in all Trendelenburg degrees, including the neutral position. Both 15 and 30 degree Trendelenburg positioning resulted in a significant increase in CSA, both in conventional and inferior approaches, when compared to neutral positioning ($p = 0.00$).
**Conclusion(s):** Following these results, the use of 15 degree Trendelenburg positioning has notable significance for CSA when used with the inferior approach. Fifteen degree Trendelenburg positioning appears sufficient.
**Reference:**
1- Verghese ST, McGill WA, Patel RI, Sell JE, Midgley FM, Ruttimann UE. Ultrasound-guided internal jugular venous cannulation in infants: prospective comparison with the traditional palpation method. Anesthesiology 1999; 91: 71-77.

## 05AP04-3

### Preterms, neonates and children up to six month of age are prone to exhibit burst suppression while receiving even moderate dosages of anesthetics

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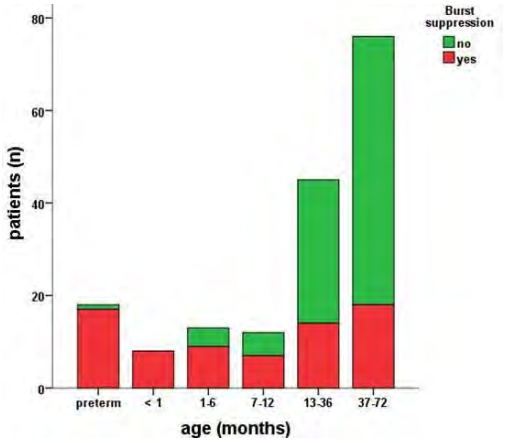
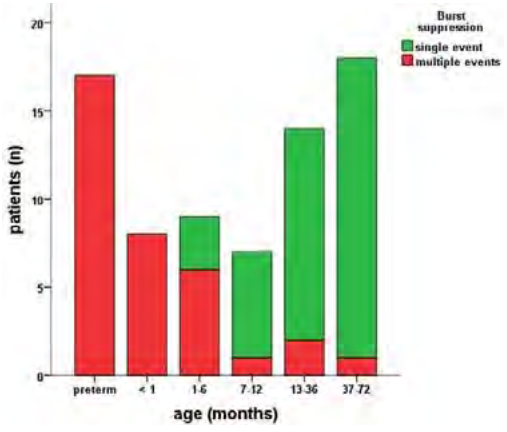
**Background:** To explore whether routinely applied dosages of anaesthetics result in unwanted burst supression, we retrospectively analyzed collected EEG (Narcotrend®) of children aged 0-6 years undergoing general anaesthesia.
**Materials and methods:** Children who underwent surgery between July 2013 and March 2015 and received general anaesthesia with EEG monitoring were included. Data were collected from anaesthesia records and the Narcotrend® database. Collected data were analyzed at predefined time points (induction, 10 min thereafter, before, 5 and 15 min after incision and time of wound closure). Average values of sevoflurane and continuously administered propofol were calculated as mean of values recorded for the 6 time points.
**Results:** Data of 172 children undergoing anaesthesia with EEG monitoring for various types of general pediatric surgery were analyzed. Children received median dosages of propofol (0-3.6 mg/kg) or sevoflurane for induction and fentanyl (1.8-4 $\mu$g/kg), anaesthesia was maintained with sevoflurane (1.1-2.4 et vol%) in most cases, only in 18 children (>12 months) propofol (4.9-5.9mg/kg/h) was used continuously.
Preterms, neonates and children 1-6 months showed in 94.4%, 100% and 69.2% episodes of burst suppression while in children aged 7-12 months, 13-36 months and 37-72 months burst suppression was detected in 58%, 31% and 23%. In all preterms and neonates burst suppression occurred at multiple time points while this was only true for 46%, 8%, 4% and 1% in children aged 1-6 months, 7-12 months, 13-36 months and 37-72 months. (Fig1,2).
**Conclusion(s):** Our preliminary data show that children up to six month of age are very susceptible to develop enduring phases of burst suppression even if exposed to low dosages of anaesthetics. Thus, EEG based monitoring should be used to guide administration of hypnotics especially in the very young children.




*[Fig 1]*




*[Fig 2]*

## 05AP04-4

### Surgical Pleth Index in children below 24 months of age: a randomized double-blinded trial

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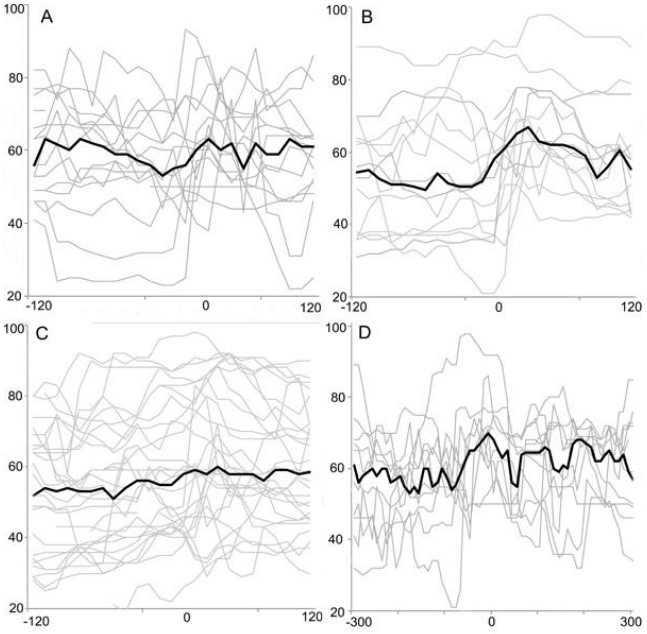
**Background and Goal of Study:** Surgical Pleth Index (SPI) is a measurement of intraoperative nociception (1). The evidence of its usability in children is limited. Since the development of neural system is strong during the first years of life, conclusions on the feasibility of Surgical Pleth Index on small children cannot be drawn from studies done in older age groups.
**Materials and methods:** Thirty children aged less than two years, planned for elective open inguinal hernia repair or open correction of undescended testicle, were recruited. They were randomized into one of two groups; receiving ilioinguinal/iliohypogastric nerve block (BG) or saline injection (SG) preoperatively ultrasound guided and in opposite order after surgery. The SPI was recorded blinded and analysed at the time points of intubation, incision and when fentanyl was administered based on clinical decision.
**Results and discussion:**

| | BG | SG | p-value |
|---|---|---|---|
| Age(weeks) | 21.6 (21.6) | 23.7 (23.4) | 0.800 |
| Gestational age (weeks) | 57.1 (23.5) | 61.3 (23.7) | 0.633 |
| Height(cm) | 58.0 (11.9) | 63.0 (2.22) | 0.311 |
| Weight(kg) | 5.8 (3.1) | 6.8 (2.2) | 0.325 |
| ASA I/II/III(n) | 2/12/1 | 5/10/0 | |
| Fentanyl($\mu$/kg) | 3.0 (0.8) | 2.4 (0.64) | 0.386 |

*[Patient characteristics]*

There was a significant increase in the SPI after intubation (p=0.019) and after incision in the Saline Group (p=0.048), but not at surgical incision in the Block Group (p=0.177). An increase in the SPI was also seen at the times when fentanyl was needed (p=0.008).




*[Characteristics of SPI]*

Figure 1 The median value of the SPI at incision in BG (A), SG (B), intubation (C) and at times when fentanyl was given (D) . Grey lines represent each individual and the black line shows the median of all measurements. The time point of interest is located at the middle of the x-axis (0). The total time line is 240 sec (A-C) and 600 sec (D).
**Conclusion(s):** The SPI is reactive on small children after the intubation and after surgical stimulus. The reactivity of the SPI is rather small and there is marked interindividual variability in reactions. The reactivity is blunted with the use of neuraxial blockade.
**Reference:** 1. Huiku M et al. BJA 2007;98:447-55.

## 05AP04-5

### Train-of-four ratio recovery precedes twitch recovery after reversal of neuromuscular block by sugammadex in paediatric patients

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**Background and Goal of Study:** The train-of-four ratio (TOFR) is used as the basic parameter of neuromuscular monitoring (NMM) for recovery from neuromuscular blockade (NMB). TOFR reflects the effects of the neuromuscular blocking agent (NMBA) at the pre-synaptic membrane of the neuromuscular junction (NMJ), as the single twitch response reflects these effects at the post-junctional membrane, which is directly related to the force generated. The aim of this retrospective analysis was to investigate the relationship of recovery of T1 and the TOFR, after the reversal of rocuronium-induced NMB with two diferent dosis of sugammadex (2 and 4 mg/kg) and monitor the performance of T1 high in relation to the final T1 height for 5 minutes after reversal.
**Materials and methods:** The study was designed as a single centre randomised controlled open-label study to investigate NMM calibration in pediatric patients. Ethical approval was provided. Fifty patients (ASA I-III, aged 2-11y) scheduled for abdominal surgery were included. Standard anaesthesia, including NMM, was performed. Reversal of the rocurinium-induced NMB was performed by either sugammadex 2 or 4 mg/kg. The NMM data were evaluated.
**Results and discussion:** Forthy-three patients could be evaluated. Age, gender, ASA status and BMI were similar between groups. NMM characteristics are presented in Table 1 and 2.

| | Sugammadex 2 mg/kg | Sugammadex 4 mg/kg | p value |
|---|---|---|---|
| n | 25 | 18 | |
| Time to recovery TOF 0.9 (s) | 92.4±57.7 | 113.3±53.5 | 0.234 |
| Time to T1 height recovery 0.9 (s) | 163.2±111.6 | 220.8±73 | 0.063 |
| Difference (time T1 height 90% - time to TOF 0.9)(s) | 70.8±101.9 | 107.5±60.9 | 0.181 |

*[Table 1. Recovery times to TOF 0.9, T1 height 0.9]*

| | Sugammadex 2 mg/kg | Sugammadex 4 mg/kg | p value |
|---|---|---|---|
| n | 25 | 18 | |
| Comparison T1 height at TOF 0.9 / Final T1 height | 82±10.6 | 72.5±10.7 | 0.007 |
| Comparison T1 height-3min after TOF 0.9 / Final T1 height | 96.5±5.7 | 93.8±4.5 | 0.109 |
| Comparison T1 height-5min after TOF 0.9 / Final T1 height | 99±4 | 100.3±3.7 | 0.315 |
| Final T1 | 89.6±17.9 | 91.6±14.4 | 0.69 |

*[Table 2: Performance of T1 height in relation to t]*

**Conclusion(s):** After the reversal of rocuronium-induced NMB with sugammadex, complete recovery of TOFR to 0.9 was significantly faster than T1 recovered to 90% in paediatric patients. A full recovery of the TOFR was possible when T1 was still depressed.

## 05AP04-6

### Chest ultrasound vs. radiography for the detection of pneumothorax in the postoperative neonatal and pediatric population - a prospective single centre study from a major cardiac intensive care unit

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**Background:** Point-of-care ultrasound is being increasingly utilized in the acute care setting. In adults, chest ultrasound (US) is shown to be a safe, fast, inexpensive and superior alternative to chest radiographs (CXR) when it comes to diagnosing pneumothorax (PTX). However, comparative evidence in the pediatric literature is sparse. The aim of our study was to compare these two modalities for the diagnosis of PTX as well as evaluate the need for routine CXR after chest drain removal in the pediatric CICU.
**Methods:** Data collection was approved by the Clinical Audit team as part of a quality improvement project. All patients were evaluated within two hours after chest drain removal with a CXR. While blinded to each other's results, one ICU physician made a preliminary CXR report while another performed targeted US of the pleura with the aim of diagnosing PTX. Sensitivity, specificity and predictive values were then calculated based on the formal CXR report given by the radiologist.
**Results:** In this pilot study, 20 patients were included and of these 19 went on to the final analysis. One patient was excluded due to extensive subcutaneous emphysema occluding ultrasonic view. In the formal report PTX was present in 5 out of 19 (26.3 %) patients. With this acting as control, chest US had a sensitivity of 80% (95% CI: 63-91) and a specificity of 97% (95% CI: 84-100). CXR reported by ICU physicians had a sensitivity of 40% (95% CI: 25-57) and a specificity of 94% (95% CI: 80-100). The calculated positive predictive values for chest US and CXR were 80% (95% CI: 63-91) and 50% (95% CI: 34-66), respectively. The negative predictive values were 97% (95% CI: 84-100) and 91% (95% CI: 76-98). None of the patient included required new interventions.
**Conclusion:** Our study indicates that when comparing chest US to CXR interpreted by the CICU physicians, US provides a higher degree of both sensitivity and specificity for the diagnosis of PTX after chest drain removal. Furthermore, it is a safe and widely available tool that can help reduce cumulative radiation exposure as well as the risk associated with patient handling during chest radiographs in the ICU. Major limitations include extensive subcutaneous emphysema as well as large surgical dressings, both occluding the ultrasonic view.

## 05AP04-7

### The role of ultrasonography in determination of the appropriate endotracheal tube size selection in pediatric patients

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**Background and Goal of Study:** The aim of this prospective clinical study was to investigate the success of ultrasonography (USG) in pediatric patients in predicting the appropriate sized cuffed ETT and compare the results with aged and weight based formulas.
**Materials and methods:** Children aged between 0-13 years who received general anesthesia with endotracheal intubation were enrolled in the study.
In all participants, subglottic airway diameter was measured with USG and age (Motoyama-Khine) and weight based (Broselow) ETT size was calculated. For USG method, transvers diameter of subglottic airway was measured at the anterior neck at the caudal of the cricoid cartilage without ventilation. ETT size was chosen according to the measured subglottic airway diameter. If there was resistance to passage of the tube into the trachea, a tube one size smaller was replaced. Airway pressures (P) were recorded and if P was above 25 $cmH_20$, ETT was replaced with one size larger.
Time for the measurement with USG and the need for ETT replacement were recorded.
A Bland-Altman assessment was used for assess the similarity of two measurement method.
**Results:** 120 pediatric patients were included. Demographic data are presented in Table 1.

| Gender (f/m) | 55 (45.8 %) / 65 (54.2%) |
|---|---|
| Age (year) | 5.4 ± 2.4 |
| Height (cm) | 115.5 ± 14.6 |
| Weight (kg) | 20.2 ± 6.1 |
| ASA* (I /II) *ASA: American Society of Anesthesiologists | 117 (97.5%) / 3 (2.5 %) |

*[Demographic characteristics of patients]*

USG measured diameter was found to be significantly smaller than the diameter as measured by other methods. According to Bland-Altman analysis, measurement with USG was significantly different from age-based calculation ($p<0.001$). Likewise, measurement with USG was also significantly different from weight-based calculation($p<0.001$).
In eights patients, ETT was changed with a one size larger tube and therefore success rate with USG was %93.3. The average peak pressure was 17.7±3.0

cm $H_20$ and measurement duration required for USG was 5.1±0.5 seconds.
**Discussion:** In this study, USG measurement guided ETT size selection resulted in smaller diameter tubes when compared to age and weight based calculations. Out of the two formulas, weight based calculation was more closely related with USG measurements.
**Conclusion:** Our findings show that USG appears to be a reliable predictor for the assessment of the subglottic diameter of the airway in children to estimate the appropriate size ETT for intubation.

## 05AP04-8

### Regional oxygen tissue saturation and blood lactate levels in the perioperative period in children undergoing cardiac surgery for congenital heart disease. Is there a correlation?

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**Background and Goal of Study:** Cerebral oximetry is an index of noninvasive monitoring of regional oxygen tissue saturation ($rSO_2$) and a sensitive index of cerebral hypoperfusion and hypoxia. Perioperative $rSO_2$ readings could provide prognostic information on future adverse events such as seizures, cardiac arrest, chest reopening and neurodevelopmental disability. In situations with inadequate oxygen delivery, such as may be encountered intraoperatively during cardiac surgery for congenital heart disease, low $rSO_2$ readings signal inadequate oxygen delivery and call for therapeutic interventions. More established perioperative monitoring methods including blood lactate are routinely used in the care for our patients with congenital heart disease. The purpose of this study was to identify correlations between these two methods of perioperative monitoring in congenital heart surgery.
**Materials and methods:** Ten pediatric patients with congenital cardiac defects (Atrial Septal Defect, Ventricular Septal Defect) that underwent protocol corrective surgery requiring cardiopulmonary bypass (CPB) were monitored with right and left cerebral oximetry. Near-infrared spectroscopy ($rSO_2$) and lactate were measured at 11 time points, from baseline preoperatively, after induction of anaesthesia, before and after sternotomy, start of cardiopulmonary bypass, aortic clamping, maximum hypothermia, aortic unclamping, rewarming, end of bypass and at the end of surgery. Associations between $rSO_2$ values and lactate levels where tested using Spearman correlation analysis ($p<0,05$) .
**Results and discussion:** Ten patients with a median age of 4 years and weight of 12,0 kg were studied. Cerebral $rSO_2$ was not significantly related to lactate levels at any of the time endpoints other than at the beginning of CPB ($p=0,038$, $r=0,814$).
**Conclusion(s):** Readings of $rSO_2$ is a complementary tool to other methods of perioperative patient monitoring including arterial blood lactate. Their significance on clinical outcome and the relationship between them remains to be seen and is an area of further research.

## 05AP04-9

### Non invasive haemodynamic monitoring system in pediatric settings: Is time to clinical validation ?

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**Background and Goal of Study:** The ideal haemodynamic monitoring doesn't exist neither in adult nor paediatric setting: the macrohaemodynamic parameters such as cardiac index (CI) and fluid responsiveness (SVV) might guide the best treatment of paediatric medium and high complexity surgery. The lack of resources, safety tests and knowledge in large number of patients, has conditioned the clinical validation protocols to improve the mortality and morbidity outcomes. The aim of this prospective - observational study was to investigate the accuracy, precision and ability of continuous haemodynamic indices (MAP/CI/SVV) by Non Invasive and Calibrate System (Clear Sight-Edwards Lifescience) and Invasive Pulse Contour Cardiac Output (PiCCO-Pulsion Medical System).
**Materials and methods:** Statistical analysis was performed by comparing the mean and standard deviations of the study indices (T0 Baseline vs. T1, T2, T3, T4) using Student's "T-Test" for paired data. The level of statistically significant was set up $p<0,05$.
**Results and discussion:** One - hundred and twenty parameters recorded in 10 patients (Age = 7 months to 4 years - Weight 10 Kg - 14 Kg - BSA 0,5-1,44) undergoing Orthotropic Liver Transplantation in five different phases: T0 (Baseline); T1 (Dissection phase); T2 (Anhepatic phase); T3 (Reperfusion phase) and T4 (End phase). A comparison between calibrate vs uncalibrate non invasive arterial pressure waveform analysis in haemodynamic monitoring showed a statistically significant correlation in SVV for predicting fluid responsiveness ($p<0,001$-correlation coefficient $r=0,086$): arterial blood pressure did not predict fluid responsiveness in children. There was no agreement in CI measuring ($p>0,02$ - correlation coefficient $r=0,046$) between the two haemodynamic techniques: the biases correlated with systemic vascular resistance ($r=0.13$ - $p=0,029$).
**Conclusion(s):** The limitations of our study include the simple observational study, low number of patients in a single center. The clinical validation protocols should be warranted to verify clinical efficacy of these devices in paediatric settings.

## 05AP04-10

### Non-invasive assessment of hemodynamic changes (in cardiac output) during induction of pediatric anesthesia

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**Introduction:** Induction of general anesthesia frequently causes hypotension both in children and adults. Although cardiac output relates much better with the delivery of oxygen to the tissue, it is not usually measured. Common extended hemodynamic monitoring is invasive and expensive. Modern devices such as modified thoracic electrical bioimpedance are simple and cost effective. In this present study, we investigated the effect of anesthesia induction on cardiac output in children.
**Methods:** After approval of the local ethics board and written parental consent 149 children with all kind of operations and different age groups got included. Exclusion criteria were congenital heart defects. The electrical velocimetry was started prior to anesthesia induction.
**Results:** 149 patients were subdivided into 3 age groups. 18 patients were under the age of 1 year. 45 patients were in the age group between 1 and 5 years. The third age group was between 5 and 18 years including 86 children. The cardiac index (CI) relates the cardiac output in one minute to body surface area (l/min/m2). In group 1 the maximum decrease of CI during the induction was 11.4% (-17.4/+9.8) at T7 compared to absolute basal values. Maximum decrease of mean arterial pressure was 28,3% (-34.1/-13.9) at T7 (T0 vs. T7, $p<0.001$).
**Conclusions:** The induction of anesthesia leads to a decrease in cardiac output in all age groups of our pediatric population. The decrease was more profound in the older children. This could be explained by the fact that in our center children more likely receive propofol for induction the older they get. Sevoflurane is known to cause tachycardia during induction, which may increase cardiac output in contrast to propofol that has a direct negative inotropic effect. This device is a practical and useful tool during anesthesia induction that allows direct feedback during induction and can help to adjust drug dosing more accurately and carefully. [1-3]
**Literature:**
1. Cote, C.J., et al., Continuous noninvasive cardiac output in children: is this the next generation of operating room monitors? Initial experience in 402 pediatric patients.
Paediatr Anaesth, 2015. 25(2): p. 150-9.
2. Holtby, H., et al., New technologies in pediatric anesthesia. Paediatr Anaesth, 2012. 22(10): p. 952-61.
3. Floh, A.A., et al., Validation of a new method based on ultrasound velocity dilution to measure cardiac output in paediatric patients. Intensive Care Med, 2013. 39(5): p. 926-33.

## 05AP04-11

### TIVA vs. VIMA - BIS-guided anesthesia and hemodynamic stability in pediatric patients

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**Background and Goal of Study:** Bispectral index was specifically developed to measure the hypnotic effects of anaesthesia and allows better titration of anesthesia, resulting in lower hypnotic drug use and improved recovery. The study compared hemodynamic stability (± 20% from baseline mean arterial pressure - MAP) pediatric patients undergoing adenotonsillectomy using two standard anesthetic techniques - BIS-guided total intravenous anesthesia (TIVA) and inhalation anesthesia (VIMA).
**Materials and methods:** One hundred pediatric patients (ASA I and II) between 3-10 years of age were randomly divided into two groups: TIVA (T group, n = 50) and VIMA (V group, n = 50). In both groups, BIS value was maintained betwen 40 and 60. The values of MAP before surgery - baseline and during maintenance of anesthesia were measured and recorded.
**Results and discussion:** The baseline MAP was 85.09 mmHg (SD = 14.55) in TIVA and 84.61 mmHg (SD = 10.70) in VIMA group. MAP during anaesthesia maintenance was 81.64 mmHg (SD = 9.40) in TIVA group and 77.73 mmHg (SD = 7.07) in VIMA group. The analysis of covariance (ANCOVA), there were statistically significant differences in MAP during anaesthesia maintenance between groups (taking into account the duration of the operation, as well as baseline MAP): F (1, 96) = 4.59, p = .035, η2 = .046, but without clinical importance. Hemodynamic instability (± 20% of initial blood pressure) is registered in 11 (22%) patients in the TIVA group, and 10 (20%) patients in the group VIMA. Using the chi-square test there was no statistically significant difference in the number of hemodynamically unstable patients: χ2 (1, N = 100) = 0.06, p = .81, w = .02.
**Conclusion(s):** BIS guided TIVA or VIMA shows no difference in hemodinamic stability during maintenance of anesthesia. Although statistically significant differences in the values of MAP during maintenance of anesthesia was noted, the same have no clinical significance.

## 05AP05-1

### Do children with learning disabilities get the perioperative hospital care they need?

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**Background and Goals:** Learning Disability (LD) is defined as significantly reduced ability to understand new or complex information, to learn new skills (impaired intelligence) along with a reduced ability to cope independently (impaired social functioning). LD affects 1.5 million people (UK), this group is likely to need medical intervention more and has worse outcome. Communication is seen as a major issue.
In our hospital, we have a specialised regional referral dental theatre for LD children. There is a perception among carers/parents of these children that though the care is satisfactory, there are systematic issues in dealing with their wards when they come to operating department for their procedures.
**Materials and methods:** We designed a questionnaire which was completed by medical and nursing staff working in the Operating Department to assess their comfort in dealing with different aspects of children with LD. It was also designed to investigate any training needs.
A Visual Analogue Scale (VAS) was used in the questionnaire; it is a psychometric response scale and superior to discrete scales as a wider range of statistical measures can be applied to the results.
**Results and discussion:** The survey was completed by 50 people on the Operating Department, spread across all grades. These included doctors, nurses, operating department practitioners, auxiliary staff, porters.
The highest scores (6.6/10) were for liaising with carers, the lowest 2/10 for effective communication with the LD children themselves.
Training for this role- dealing with LD children (and their carers) coming for surgery- scored 2.8/10.
All staff groups- doctors, nurses, auxiliary staff, porters, operating practitioners- scored similarly for self rated confidence (3.7-4.8/10). Doctors were the least confident group.
**Conclusions:** It was clear that healthcare professionals across the board did not feel confident in communicating with LD children.
Doctors showed the least confidence; Nurses and auxiliary staff were more comfortable in the role.
The staff had no real formal training to help them in this role.
There is the need for regular provision of LD training opportunities for all operating department staff, particularly in units where this patient group is managed regularly.

## 05AP05-2

### Safety of preoperative oral intake of 25% maltodextrin for enhanced postoperative recovery in children

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**Background and Goal of Study:** Oral intake of carbohydrate drink 2 hours before surgery is one of components of Fast-track surgery program. The Enhanced Recovery After Surgery protocol recommends using 12,6% maltodextrin as a carbohydrate clear beverage. Children, depending on the age, might require less volume of oral fluids compared to adults.
Therefore, due to cover caloric requirements children probably need more concentrated solution of carbohydrates. The aim of our study is to estimate safety of drinking a 25% maltodextrin beverage 2 hours before surgery in children.
**Materials and methods:** After receiving the ethic committee approval and parent's consent and child's assent (where possible) we conducted prospective pilot randomized study, which included 33 patients, aged 2-16 y.o. Patients had ASA status I and II and underwent 1-2 hours orthopaedics surgery.
Group 1 (n=15) received 5 ml per kg oral 25% maltodextrin in clear water.
Group 2 (n=18) was fasted. We evaluated the presence and volume of gastric content before induction of anaesthesia by ultrasonography of the stomach. After tracheal intubation, we aspirated from endotracheal tube and from nasogastric tube. If there was content, we measured its pH. Mean data were compared using the Student's t-test and nonparametric methods.
**Results and discussion:** According to ultrasound data, gastric content defined seldom (1 and 2 cases per groups respectively), and volume did not exceed 0,4 ml per kg body weight. Volume of gastric content from nasogastric tube was comparable in both groups (0,37 ± 0,28 ml/kg in group 1 and 0,41 ± 0,52 ml/kg in group 2, P=0,719). pH of gastric content in group 1 was significantly higher (2,75 ± 1,34 vs. 1,95 ± 0,35, P=0,02). There was no any tracheal content during aspiration from endotracheal tube. No clinical data for aspiration syndrome have been found in both groups. We did not receive any patient complaints or gastrointestinal complications after oral intake 25% solution of maltodextrin.
**Conclusion(s):** Results of our pilot study suggest that preoperative oral intake of 25% maltodextrine instead of 12,6% 2 hours prior the surgery is safe and well tolerated in children aged from 2 years and older. Further research is necessary to find out clinical and outcome advantages of this strategy.

## 05AP05-3

### A pilot randomised open-label taste-testing study to evaluate the acceptability of chocolate-based midazolam in children

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**Background and Goal of the Study:** Children reject medicines mainly because of poor taste. Midazolam, a commonly used premedication agent in paediatric anaesthesia has a particularly bitter taste and is therefore often rejected by children. To provide safer and more palatable substitutes, we have developed prototype dark chocolate mini tablets. The aims of this project are to evaluate the acceptance of the midazolam chocolate tablets and the pharmacokinetic parameters and relative bioavailability.
**Materials and methods:** Following Ethics committee approval, 150 children (3-16 years) who have been prescribed a premedication with midazolam by their treating anaesthetist, are invited to participate in this ongoing trial. The patients are randomized to receive either the chocolate-based midazolam or the currently used IV midazolam solution orally at 0.5 mg/kg. Children were asked how much they like the sample using a five point facial scale (1 very much dislike to 5 very much like). Anxiolysis was scored with a 4 point scale behavior scale (1 unafraid, calm, playing, relaxed to 4 crying, clinging, combative). The time to clinical onset of anxiolysis was recorded. Up to four blood samples were collected for population pharmacokinetic analysis of midazolam and its active metabolite.
**Results and discussion:** These are the results of a pre-planned interim analysis following the administration of chocolate tablets to 20 children. The time to onset of sedation was similar between both groups (IV (mean±SD) n=18, 11.3±5.0, choc 12.4±6.4 minutes). All children in the chocolate group had adequate anxiolysis at the induction of anaesthesia, while 4 children in the standard group had insufficient anxiolysis. The children preferred the midazolam chocolate formulation (IV 1.5±0.6, choc 3.4±1.0). Parents and administering clinical nurses also scored the chocolate tablet superior in observed taste compared with the IV solution as 2.1±1.2 vs. 3.5±1.1, 2.2±1 vs. 3.2 ± 1.2, respectively. The final results of the pharmacokinetic modelling are outstanding.
**Conclusions:** All children receiving chocolate midazolam achieved clinical effect within 30 min and the midazolam chocolate appears to be the preferred formulation compared with the orally ingested IV solution.

## 05AP05-4

### Intraoperative music application in children and adolescents: impact on postoperative patient comfort and behaviour

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**Introduction:** Hospitalisation, surgery and anaesthesia may considerably affect children or adolescents, leading to postoperative, new-onset maladaptive behaviours or emotional distress and Trauma. Maladaptive behaviour like nighttime crying, separation anxiety, temper tantrums, enuresis, general anxiety or poor appetite have been described in up to 50% of the cases. As therapeutical approaches, both pharmacological and complementary non-pharmacological methods have been increasingly studied in the recent years. In adults, Nilsson et al. showed that patients intraoperatively exposed to music have significantly lower pain levels. In children, however the effect of intraoperative music is unclear while preoperative music application showed no effect on behaviour. The object of this prospective, randomized blinded trial was to investigate effect of intraoperative music application in paediatric anaesthesia.
**Methods:** After obtaining approval from the independent ethics committee and written informed consent, children with ASA classification I or II, aged from 4 to 16 years and scheduled for elective circumcision or inguinal herniotomy in combined general and caudal anaesthesia were included. Children were randomized into two groups, either receiving music application (M-group) or having headphones placed without playing music as placebo (P-group) during surgery. PACU staff, patients and parents were blinded.
Postoperative nausea and vomiting (PONV), emergence delirium, recovery and pain score were evaluated by the PACU staff. Postoperative behaviour at home was documented by parents on the 7th, 14th and 30th days after surgery using a questionnaire adapted from the "Post Hospitalization Questionnaire" (PHBQ). Mann-Whitney-test was used to analyse nonparametric data. For demographic data Qui-Square test was used. Results are shown as median (IQR).
**Results:** In total 137 children aged 79 (48-190) months, weighing 22.2 (12-62) kg were included, and 114 questionnaires were returned and analysed. Demographic data was similar in both groups, except for a significantly higher rate of circumcisions in the M-group (p=0.03).. There were no significant differences between the two groups regarding pain score, PONV, antiemetic treatment, wake-up behaviour and behavioural changes during the first 30 days.
**Conclusion:** Intraoperative music application does not affect postoperative patient comfort or postoperative behaviour in children or adolescents.

## 05AP05-5

### Effects of auditory and audiovisual presentations on childrens' anxiety and behavioral changes

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**Background and Goal of Study:** The purpose of the current study is to evaluate the impact on preoperative anxiety and postoperative behavioral disturbances of videotape and auditory presentation about perioperative period in children undergoing elective ambulatory surgery.
**Materials and methods:** After obtaining Ethics Committee approval; 99 patients, aged 5 to 12 years and scheduled to undergo outpatient surgery were accepted in the study. Participants were randomly divided into three groups: control group (group C, n=33), group applied to auditory presentation (group A, n=33) and group applied to videotape presentation (group V, n=33). The patients in group C were explained anesthesia and analgesia management, preoperative fasting and regular use of the drug to be administered after surgery, by an anesthesiologist. The patients in group V were shown videotape related to preoperative preparation and postoperative period. In group A were listened only sound recording of this video. These implementations were made during preoperative visit. All children were no used premedication and general anesthesia was administered to them. The preoperative anxiety levels of children were measured with Modified Yale Preoperative Anxiety Scale (M-YPAS) at induction of anesthesia after taken into the operating room. Parents were contacted by telephone to assessing the behavior changes of their child's at 7 days after hospital discharge. This evaluation was performed using Post Hospitalization Behavioral Questionnaire (PHBQ).
**Results and discussion:** There were no significant differences in demographic characteristics of patients and parents between the 3 groups. M-YPAS scores were significantly lower in group V than groupC and A ($p<0.05$). PHBQ scores in group C had statistically higher than in group A and V. However, no statistical difference was between group A and group V.
Pharmacological and non-pharmacological methods or combination of the two methods may be used in the management of preoperative anxiety. Non-pharmacological methods contain parental presence, preoperative information programs, distraction techniques. At the present time, these programs are effectively used.
**Conclusion(s):** Audiovisual presentation on reducing childrens' anxiety may be more effective in terms of memorable and interesting compared to auditory presentation. But, we can suggest that both methods can be equally effective for postoperative behavioral changes.

## 05AP05-6

### Deviations in preoperative fasting guidelines in children

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**Background and Goal of Study:** It is routine clinical practice to follow the American Society of Anaesthesiologists (ASA) and European Society of Anaesthesiology (ESA) fasting guidelines before anaesthesia or sedation in children, that recommend abstaining from clear fluids for up to 2 hours, breast

milk for up to 4 hours, and milk formulas and solids for up to 6 hours, in order to reduce the risk of regurgitation and pulmonary aspiration.
**Materials and methods:** Our prospective, observational study included 617 children undergoing anaesthesia or sedation from June 1 to December 1 2015. During the preanaesthetic visit parents were informed about fasting guidelines and given written recommendations. Patient data and fasting times were recorded from the medical records immediately before anaesthesia or sedation. After the procedure, the fasting times were rechecked with a nurse or the parents.
**Results and discussion:** The children were 10 days to 20 years old (median six years, mean±SD 6.87±4.98 years), with body weight ranging from three to 135 kg (median 21 kg, mean±SD 28.43±20.15 kg). Preoperative fasting times ranged from two to 28 hours (median 11 hours, mean±SD 10.26±4.51 hours) and the median deviation from the recommended preoperative fasting time was six hours (range -2 to 17 hours, mean±SD 5.86±3.61 hours). Both age and body weight were positively correlated with both fasting duration and deviation from the recommendations
($P<0.01$ for all Pearson's and Spearman's correlation coefficients ranging from 0.134-0,248). There were significant differences between median fasting times and deviations from the recommendations between different hospital departments, with pulmonology and intensive care units having the shortest median fasting time and the smallest median deviation, while urology and gastroenterology were on the opposite side of the spectrum (Kruskal-Wallis, both $P<0.001$). As expected, the median fasting time as well as the median deviation from the recommendations were significantly lower in children with urgent operations when compared to children with elective operations (Mann-Whitney, both $P=0.007$).
**Conclusion(s):** The prolonged fasting time in our hospital could be attributed to several factors. In order to reduce the deviations from fasting guidelines, anaesthesiologists need to improve their communication with the ward staff, as well as the organization of preanaesthetic visits.

## 05AP05-7

### Unilateral electrical stimulation of the heart 7 acupuncture point to prevent emergence agitation in children: a prospective double blind randomized controlled trial

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**Background and Goal of the Study:** Emergence agitation (EA) is a frequent phenomenon in children recovering from general anaesthesia and increases the risk of self-injury. Previously, we reported that stimulating the heart 7 (HT7) acupuncture point bilaterally using two neuromuscular transmission monitoring devices (NTMs) decreased the incidence of EA; the risk ratio was 0.56 (95% confidence interval: 0.36-0.86).
However, bilateral stimulation is a barrier to clinical use because two NTMs are needed for one patient. The objective of this study was to examine the efficacy of unilateral electrical stimulation of HT7 using an NTM to prevent EA in children.
**Methods and Materials:** This was a prospective, randomized, double-blind controlled study, that included children (ages 18-96 months) scheduled to undergo sevoflurane anaesthesia. The enrolled subjects were randomly assigned to one of the following two groups:
(1) HT7 group: unilateral (right side) stimulation of the HT7 acupuncture point located on the ulnar side of the wrist by using a single-twitch electrical stimulus (1 Hz, 50 mA) throughout the surgery, and
(2) control group: only electrodes were attached to the right side HT7 point; an electrical stimulus was not applied.
A power analysis ($\alpha = 0.05$, $\beta = 0.20$) indicated that 40 patients were required in each group. To allow for 20% dropout rate, we recruited 50 patients for each group. The primary outcome assessed was the incidence of EA. The incidence and severity of EA were evaluated using the paediatric anaesthesia emergence delirium (PAED) scale, and a score $\geq 10$ demonstrated the presence of EA. Assessors who were blinded to the group allocation recorded the PAED score in the recovery room.
**Results and discussion:** All 100 enrolled subjects completed the study. The patient's characteristics were not different between the groups. There was no statistical difference between the incidence of EA in the HT7 and the control group (28.0% vs. 24.0%; $P = 1.0$). The risk ratio was 1.17 (95% confidence interval: 0.60-2.27). The wide range of the confidence interval precludes any definitive conclusions.
**Conclusion:** In this study, we did not identify the effect of single-twitch electrical stimulation to the unilateral HT7 on the incidence of EA, contrary to findings with bilateral HT7 stimulation. The effect of other types of stimulation (e.g., train-of-four, or tetanus stimulation) to unilateral HT7 on the incidence of EA should be examined in the future.

## 05AP05-8

### Thromboelastographic evaluation of hemostatic function in children undergoing liver transplant

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**Background and Goal of Study:** Bleeding remains one of the most challenging aspects in anesthesiological management of pediatric liver transplantation (OLTx). Hemostatic abnormalities in end stage liver disease are the result of both pro-thrombotic and anti-thrombotic alterations which have not been fully investigated in pediatrics[1]. This study aims to describe the thromboelastgraphic (TEG) asset in a pediatric population undergoing OLTx.
**Materials and methods:** After approval of ethic committee, patients up to 15 years old undergone OLTx from august 2010 to august 2014, with at least one thromboelastogram performed at time of anestesia induction were retrospectively studied.
**Results and discussion:** 24 patients were enrolled. Underlying diseases were: biliary atresia(n=15), fulminant hepatic failure(4), hepatoblastoma(2), Alagille syndrome(2), primary hyperoxaluria(1). Mean age was 3.56 y (range:6m-14y). Mean peld score was 19.3 (range:-8-40). Standard laboratory testing (mean values) showed hypocoaugulability (PT-INR 1.8), hypofibrinogenemia (89.26 mg/dL), and thrombocytopenia (117*10^9/L). Mean thromboelastographic parameters where R 7.7 3., K 3.0 2.2, α 58.1 13.4, MA 56.0 15.3 and LYS30 4.981 20.9 (see table 1 for normal values). No differences were found in different groups of disease. Reference TEG values in pediatric cirrotic population are not reported so far. Despite standard laboratory testing showed hypocoagulability, we found no statistically significant difference between our TEG parameters and the reference TEG values reported for healthy newborns[2].
**Conclusion(s):** Coagulative asset of cirrhotic pediatric patient is not antithrombotic. Further studies are needed to confirm our data; however our results suggest that transfusion strategy exclusively based on traditional blood clotting tests should be abandoned.
**References:**
1. Lisman T et al-Haemostatic abnormalities in patients with liver disease J.Hepatol.2002Aug;37(2):280-7
2. Edwards RM et al-Parameters of thromboelastography in healthy newborns Am J Clin Pathol.2008Jul;130(1):99-102

## 05AP05-9

### Intraoperative blood loss during scoliosis surgical repair - 3 years of experience in a tertiary center

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**Background and Goal of Study:** Blood loss is an important concern in performance of scoliosis surgical repair (SSR). Our aim was to analyse intraoperative estimated blood loss (IEBL) and its association with multiple patient, surgical and anaesthetic variables.
**Materials and methods:** We conducted a database analysis in our tertiary center of all surgeries for SSR between January 2012 and December 2014. Re-interventions were excluded. Patients' demographics perioperative surgical and anaesthetic data were collected. IEBL was rigorously registered in each surgery as volume of blood suctioned from the operative field, blood loss collected on sponges and estimates of blood loss on drapes, gowns, and floor. Postoperative complications(PC) were divided in neurologic, respiratory, hematologic and hemodynamic. Descriptive analysis was performed and the Student's-T test, Mann-Whitney test, Chi-square or Fischer's exact test were used.
**Results and discussion:** From 99 patients 13 were excluded due to incomplete data. Patients were then divided in two groups: with less or more (or equal) than 25% of total estimated blood volume (EBV) loss during surgery. IEBL of more than 25% of EBV was present in 41 patients. Patients with ≥

25% of EBV of IEBL had more frequently: neuromuscular disease 53,7% vs idiopathic 22,2% (p=0,003), surgery to 10 vertebral levels or more (p=0,018), higher maximum major curve (p=0,041), intraoperative transfusion (p<0,001), intraoperative use of a synthetic colloid (p<0,001), intraoperative use of a vasopressor (p=0,002), longer duration of surgery (p<0,001) and of total hospital stay (p<0,001). They were also younger (p=0,002) and with higher ASA physical status (p=0,010). Regarding weight percentiles rating, patients under the 25 had more frequently ≥ 25% of EBV of IEBL (53,7% vs 13,3% p<0,001) while patients over percentile 50 had it less frequently (26,8% vs 68,9%, p<0,001). PC were more frequent in the group with ≥ 25% of EBV of IEBL (p=0,001). Sex, pre and postoperative hemoglobin and associated cardiac or respiratory disease, were not different between groups.
**Conclusion(s):** In 3 years of experience in SSR, 47,7% of patients had an IEBL of more than 25% of EBV.Younger patients with neuromuscular scoliosis, higher major curves, under percentile 25 of weight and who had manipulated more than 10 vertebral levels had a considerably IEBL. Recovery in a high dependency unit should be pondered for these patients as PC were more frequent.

## 05AP05-10

### Postoperative observational pain measure by nurses does not reliably reflect parental Visual Analogue Scale ratings of children's pain

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**Background and Goal of the Study:** Postoperative pain following adenotonsillectomy in children is a major issue. Evidence supports the psychometrics of observational behavior pain assessment tools and parental global rating scales.
**Aim of the study:**
1. to evaluate the validity of nurses' pain behavior assessment of the child compared to a global pain assessment by the parent;
2. to assess the influence of parental state anxiety.
**Materials and methods:** After IRB approval, a prospective cohort study was carried out investigating intra-hospital pain after adenotonsillectomy in daytime surgery.
Inclusion: eligible were all consecutive children between 1.5 and 5 years old, ASA 1&2, good Dutch comprehension of the parent.
Exclusion: mental retardation.
Instruments:
a. the Face, Leg, Activity, Cry, Consolability scale (FLACC) scored by 2 nurses (1 nurse was always the same) at 2h and 4h postoperative;
b. Visual Analogue Scale (VAS) consist of a 100-mm horizontal line with two extremes, *‚no pain'* (left) and *‚severe pain*' (right), on which the parent place a vertical line at 2h and 4h postoperative. Parents were instructed. 3. parental anxiety was measured by Spielberger's State-Trait Anxiety Inventory (STAI).
Statistics:
1. absolute agreement between nurses FLACC scores using intraclass correlation coefficient (ICC);
2.concurrent validity between FLACC and parental VAS scores were computed (Spearman rank);
3. discriminant validity: McNemar test after dichotomizing pain scores into 2 groups (non to mild pain *vs.* moderate to severe pain) using cut-off values of respectively ≥ 3 on the FLACC and ≥ 30 mm on the parental VAS ratings.
4.correlation between parental VAS scores and STAI (Spearman rank).
**Results and discussion:** The cohort included 82 children (50 % boys) with mean age of 46.6 (months), SD ± 10.9. ICC between de FLACC scores at 1h (r = .82; 95% CI [.72 -.89]; P =.00) and at 4h (r = .86; 95% CI [.76 -.91]; P =.00). Correlations between FLACC and VAS were moderate (at 2h: r =.39; P =.00 and at 4h: r = .33; P =.00). After Dichotomizing pain scores at 2h [$FLACC_{2h}$: n = 3 (3.7 %) had moderate to severe pain *vs.* $VAS_{2h}$ : n = 45 (55.6%); P <.0001] and at 4h [$FLACC_{4h}$: n = 5 (6.1%) had moderate to severe pain *vs.* $VAS_{4h}$: n = 39 (37.6 %); P <.0001]. Moderate correlations exists between VAS and STAI (r =.22; P = .005).
**Conclusions:** Nurses FLACC scores do not reliably reflect VAS parental pain perceptions. VAS pain scores are influenced by parental anxiety.

## 05AP05-11

### Optimising discharge analgesia in children undergoing adenotonsillectomy: a quality improvement project

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**Background and Goal of Study:** Adenotonsillectomy is associated with significant postoperative pain requiring adequate analgesia. Following safety concerns over codeine in children it was removed from our institution's take-home analgesia regime. A subsequent quality improvement project showed that regular paracetamol and ibuprofen provided inadequate analgesia. Take-home analgesia for children undergoing adenotonsillectomy was changed to include 5 ‚as required' doses of oral morphine (0.1mg/kg). We aimed to evaluate whether this was adequate.
**Materials and methods:** 25 children aged between 2 and 15 undergoing tonsillectomy or adenotonsillectomy at the University Hospital of Wales were recruited. Parents recorded their child's worst pain score using a visual analogue scale or the Wong-Baker faces scale each day, for 10 days postoperatively. Parents recorded the number of doses of paracetamol and ibuprofen administered daily, the timing of oral morphine doses and if oral morphine was effective. Parents were asked if their child would have benefited from additional analgesia. Phone calls were made to the parents after the tenth postoperative day to collect the data.
**Results and discussion:** Despite regular paracetamol, ibuprofen and PRN oral morphine little change was seen in the pain scores from the previous project but it was felt our method of recording worst pain underestimates the effect of rescue analgesia. It was noted that 17% of parents did not give their children oral morphine. On questioning, 94% of parents that used oral morphine reported it effectively relieved pain. 42% of parents expressed that they would have wanted more postoperative analgesia (59% in the previous project) with "more doses of morphine" being a common comment.
**Conclusions:** Oral morphine works as an effective rescue analgesic but there appears to be some reticence amongst parents to give opiates. Parents need guidance and reassurance to give opiate rescue analgesia appropriately. Parental satisfaction improved following the addition of oral morphine to our analgesic regime but some patients require more than 5 doses of oral morphine given the significant and prolonged pain associated with adenotonsillectomy. Our new take home regimen includes 10 'as required' doses of oral morphine with new written advice to guide and encourage its appropriate use. In the future we hope to demonstrate further improvement in post-operative pain scores in children undergoing this procedure.

## 05AP06-1

### Body mass index is an independent predictor of increase in serum S100B in children after the anesthesia with sevoflurane or propofol during elective adenotonsillectomy: Croatian prospective cohort study

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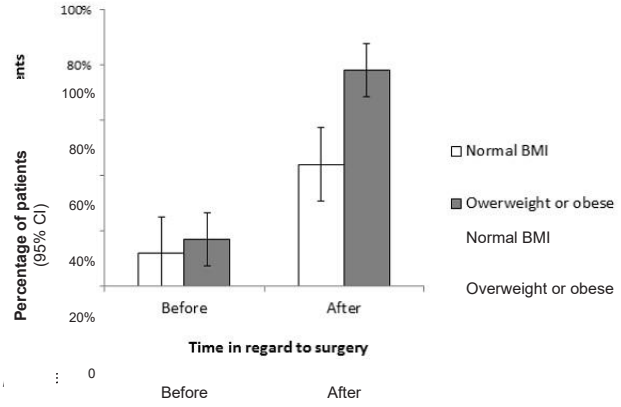
**Background and Goal of Study:** S100B protein is a common biomarker of cerebral injury. Previous studies have resulted in controversial findings on association of BMI with S100B. The aim of this study was to assess the independent association of BMI with cerebral injury indicated by negative change of S100B protein levels after elective adenotonsillectomy in children 6-13 years old.
**Materials and methods:** Prospective cohort study was conducted at University Hospital Split on 59 children (aged 6-13) undergoing elective adenotonsillectomy performed by one surgeon and one anesthesiologist. Children were anesthetized by sevoflurane or total intravenous anesthesia with propofol. Our key outcome: serum S100B negative change was defined as the change from normal biomarker level (<0.105 ng/mL) before to the elevated biomarker level after the surgery (≥0.105 ng/mL).
**Results and discussion:** We included a sample of 59 children, 52% of them female, with median (interquartile range) age of 7 (6.0-9.8) years. 30% of children were overweight or obese (BMI≥85$^{th}$ percentile). After adjustment for age, sex, type of anesthesia, indication for surgery and surgery duration, overweight or obese children had almost four times higher odds for experiencing cerebral injury indicated by S100B negative change after the surgery (OR=3.91, 95% CI 1.05-14.56, P=0.042) (Figure 1).




**Conclusion(s):** S indicated that BMI is not associated with elevated S100B before the surgery what is consistent with our findings, but our study suggests independent association of BMI with increase of S100B after anesthesia with sevoflurane or propofol during elective adenotonsillectomy.
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## 05AP06-2

### Anesthetic management of congenital adrenal hyperplasia in children - a case report

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**Background:** Congenital adrenal hyperplasia (CAH) is an autosomal recessive disorder associated with deficiencies in 21-,11-, or 17-hydroxylase (OHD). More than 90% of CAH is caused by 21OHD. Clinical manifestations are mainly due to adrenocortical insufficiency, hyperandrogenism and adverse effects of glucocorticoids supplementation. Anesthetic management surrounds the complications of ACTH suppression due to steroid therapy, mainly hypertension, hyperglycemia, electrolyte abnormalities, adrenal and pituitary suppression and immune suppression.
**Case report:** 20 month old female with masculinization due to CAH secondary to 21OHD. Medicated with hydrocortisone and fludrocortisone since birth. Proposed to elective reductive genitoplasty under general-epidural anesthesia. After the induction of the general anesthesia we placed an epidural lumbar catheter (liquid column method); ropivacaine 0.2% was used according to anesthetic needs. She followed the adrenal insufficiency protocol of our center in the perioperative period, which consists in 2 mg/kg of hydrocortisone in the anesthetic induction and every 4 hours during surgery.
In the first 24 post-operative hours, the dose is 20 mg of intravenous hydrocortisone every 6 hours, and the habitual dose is resumed in the second post-operative day.
Procedure lasted for 6 hours and 45 minutes. Vital parameters and glucose levels were stable. Successfully extubation on operating room at the end of the surgery followed by transfer to pediatric intensive care unit. Postoperative recovery was uneventful.
Multimodal analgesia with epidural ropivacaine 0.1% infusion for 48 hours was performed, with low pain scores.
**Discussion:** Steroid supplementation is crucial in perioperative period and was performed with an initial bolus of hydrocortisone 2mg/kg, repeated at each 4 hours, during all the procedure. Hemodynamic stability and good pain control were achieved during and after the procedure. Epidural analgesia contributed to this success.
**References:**
Peds in review, 2009; 30; e49
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**Learning points:** Children with CAH can be managed successfully during anesthesia after understanding the patophysiology of disease with proper history and perioperative steroid supplementation. Hemodynamic and metabolic stability, as well a good pain control are major concerns in the anesthetic management of this patients.

## 05AP06-3

### Perioperative hypoglycaemia in infants - is glucose monitoring necessary?

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**Background and Goal of Study:** In current clinical practice dextrose is often administered to paediatric patients without monitoring glucose levels.[1] With current fasting guidelines, children and infants should be at lower risk of suffering a hypoglycaemic event.[2] Nevertheless because of traditional practice and a lack of recent data, anaesthesiologists still give dextrose containing solutions to infants and children during surgery to prevent hypoglycaemia.
The aim of this study was to determine the glucose levels of healthy infants (1 month up to 1 year) undergoing elective surgical procedures following current fasting guidelines.
**Materials and methods:** Following IRB approval, a retrospective review of the charts of all infants who underwent elective surgery involving general anaesthesia at South Infirmary Victoria University Hospital was performed. The charts were reviewed for a 38 month period and data collected included: ASA classification, duration of fasting, blood glucose levels and fluid administration.
**Results and discussion:** There were no cases of hypoglycaemia in 151 healthy (ASA 1 & 2) infants. Fasting duration was greater than the recommended guidelines in 37.09% of infants for clear fluids and 77.48% for solid

foods. 41 infants received routine dextrose containing solutions. There were 3 cases of hyperglycaemia postoperatively. In 17.9% of cases blood glucose was not recorded at any time. No clinical signs of hypoglycaemia were noted.
**Conclusion:** Our data demonstrate that perioperative hypoglycaemia is uncommon in healthy infants, even if current fasting times are not adhered to. Greater education of parents is necessary to improve compliance with recommended fasting times. The routine administration of dextrose containing solutions is not recommended in these patients. These data suggest that routine monitoring of perioperative glucose may not be necessary in healthy infants undergoing elective surgical procedures.
**References:**
1. Ayers J, Graves SA. Perioperative management of total paraenteral nutrition, glucose containing solutions, and intraoperative glucose monitoring in paediatric patients: a survey of clinical practice. Paed Anaesth 2001;11:41-44.
2. American Society of Anesthesiologists. Practice guidelines for preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration: application to healthy patients undergoing elective procedures. Anesthesiology 1999;90:896-905.

## 05AP06-4

### Pediatric mastocytosis and anesthesia: a three-case report

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**Background:** Mastocytosis is a disease with multiple variants where a pathologic increase of mast cell is present both in cutaneous and extracutaneous tissues, including gastrointestinal tract, spleen, liver, bone marrow and lymphoid tissues. Its prevalence is approximately one in 25000, and its clinical manifestations vary depending on the age of onset, disease variant (systemic vs cutaneous), severity and associated hematologic disorders. As a consequence, patients suffer gastroesophageal reflux, flushing, urticaria and hypotension. All patients are at risk for anaphylaxis during anesthesia, as drugs used may directly or indirectly degranulate mast cells[i].There is little information about the anesthetic management of pediatric mastocytosis.
**Case report:** We present three cases of children with mastocytosis we attended to in less than a month: patients 1 and 3 were admitted for urgent surgery and in both patients the desease was notified at the door of the operating room; patient 2 was admitted for elective plastic surgery. Patients 1 and 2 suffered cutaneous mastocytosis; patient 3 was diagnosed of solitary mastocytoma. None of them had ever had systemic complications. We applied the same pre-anesthetic protocol[ii] in all the patients (including corticoids, antihistamines and benzodiazepines) and none of them had any anesthetic complication.
**Discussion:** This protocol is designed for elective surgery, as it suggests to administer corticoids and antihistamines an hour before surgery, and benzodiazepines half an hour before surgery. This is not always possible in case of urgent surgery, especially when the disease is notified at the door of the operating room. We had two urgent cases where the premedication had to be administered just before anesthetic induction, but fortunately we did not have any complication.
**References:**
[i] *Pediatric Mastocytosis: Routine Anesthetic Management for a Complex Disease.* Anesth Analg 2008;107:422-7.
[ii] *Protocolos de tratamiento en las mastocitosis*. REMA. http://www.mastocitosis.org/protocolos-de-tratamiento.html
**Learning points:** Although mastocytosis is a rare disease with a low incidence, we have attended three cases of its pediatric forms in less than a month. It is important for the anesthesiologist to know the management of this desease. Premedication with corticoids, antihistamines and benzodiazepines is key to prevent a histaminic release that can lead to an anaphylactic reaction in the operating room.

## 05AP06-5

### A child with Alagille's syndrome to undergo an urgent procedure: wich are the key points for a well suceeded anaesthetic management?

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**Background:** Alagille's Syndrome (AS) is a rare and inherited disorder. We report the case of a patient with AS and an acute upper gastrointestinal haemorrhage.
**Case report:** A 6 year-old 20 kg female with AS presented to the emergency service with one-day history of hematemesis. After evaluation was decided to make an exploration by the ORL team ( beacuse a recent history of Upper Arway infection) and later an upper esophagogastroduodenoscopy in an attempt to find the location of the bleeding. She was asymptomatic, alert and oriented. The physical examination revealed she was pale with normal arterial blood pressure and a taquicardia of 130 cpm. The cardiac, respiratory and central nervus system examination were unremarkable.The liver was enlarged. Mallampati test was I. Laboratory test revealed: anemia with Hb 6,2gr. dl, ,normal platelet count, liver function was normal as was seric Bilirubin. Creatinin 1.08 Urea 0.6. PT 13,8/ APTT 32,6
She underwent blanced general anaeshtesia.Was induced with propofol and fentanyl Iv and mantained with sevoflurane and remifentanil. An endotraqueal tube was inserted after Cistaracurium 0,15mg/Kg. No bleeding was found in the upper arway. The upper gastrointestinal endoscopy revealed bleeding with clots formation in the gástric chamber. Argon-plasma was applied in two angioectasias. The procedure was performed without complications and the patient was transferred to pediatric ICU.
**Discussion:** The main clinical features of AS are chronic cholestasis, congenital heart disease, butterfly vertebrae, characteristic fácies and posterior embriotoxon. The Anesthesia plan should be based on: The careful preoperative assesment of the airway and neck mobility. A ditailed physical examination.The choice of drugs should be careful and use those wich showed no changes in liver function.A muscular relaxante whose metabolism does not derectly depend on the kidney or liver is advisable in this situation.
**Reference:**
Alagille syndrome and anesthesia management. Tulay S. Yildiz, Nurcan O. Yumuk, Duygu B, Mine S, Kamil T. Pediatric Anesthesia 2007 Vol: 17 (1) :91-92.
**Learning points:** The anaesthetic teams faces the challenge to dealing with a not so common disese.With the need for an urgent intervention, the patient assesment was based on a detailed physical examination and laboratory test. There was a careful choosing of drugs and a concern for mantaining hemodynamic and hematological stability together with good control of body temperature.

## 05AP06-6

### Neuromuscular and idiopathic scoliosis patients - how do they differ?

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**Background and Goal of Study:** Scoliosis surgery repair (SSR) has become a common procedure in both neuromuscular scoliosis (NMS) and idiopathic scoliosis (IS). This study aims to compare these two groups of pediatric populations and assess the incidence and impact of scoliosis etiology on patients' outcome after SSR.
**Materials and methods:** A retrospective review of children undergoing SSR in our tertiary university hospital from January 2012 to December 2014 was conducted. Reoperations were excluded. The analyzed parameters were: gender, age, weight percentile (WP), ASA physical status, cardiac and pulmonary pathologies (CP and PP, respectively), preoperative Cobb angle, type of scoliosis, duration of surgery, number of fused levels, estimated blood losses (EBL), intraoperative vasopressor need, intraoperative transfusion, postoperative hemoglobin value (PHb), duration of surgery, length of hospital stay, and postoperative complications (PC): neurologic, respiratory, hematologic and hemodynamic. Descriptive analysis was performed and Mann-Whitney, Chi-square or Fisher's exact test were used for comparisons.
**Results and discussion:** From 99 patients 13 were excluded due to lacking data. From the 86 patients included, 32 (37%) had NMS. NMS patients were more frequently male (43.8% vs 18.5%, $p=0.012$). A WP<25 was more usual

in NMS patients (62.5% vs 14.8%), while a WP> 50 was most common among IS patients (21.9% vs 64.8%), p<0.001. CP and PP were significantly more frequent in NMS group (CP: 34.4% vs 5.6%, p=0.001; PP: 43.8% vs 7.4%, p<0.001). NMS patients presented higher ASA physical status (p<0.001) and exhibited significantly higher Cobb angles (p=0.001). NMS patients were significantly associated with EBL> 25% (68.8% vs 35.2%, p=0.003), intraoperative transfusion (43.8% vs 11.1%, p=0.001) and duration of surgery> 4h (40.6% vs 11.1%, p=0.001). NMS had significantly longer hospital stays (p<0.001). No differences were found between groups concerning age, extent of the fusion, intraoperative vasopressor need, PHb and PC.
**Conclusion(s):** NMS and IS patients were different both in pre- and perioperative parameters, mainly in weight percentile, comorbidities and Cobb angle, as well as in EBL, intraoperative transfusion and length of hospital stay. So, regarding the etiology of scoliosis, two distinct populations exist which will require a diverse perioperative care. It seems however that NMS patients have similar rates of postoperative complications.

## 05AP06-7

### Evolution of pulmonary function tests in children with complex congenital heart disease and scoliosis corrected by posterior approach

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**Background and Goal of Study:** The association between congenital heart disease and scoliosis is well studied. It is well known the relationship between spinal deformity and deterioration of lung function, which may stabilize after surgical correction.
The aim of this study is to determine the relationship between the degree of correction and the evolution of lung function tests at one and two years after corrective surgery in patients with congenital heart disease and scoliosis. We present this study as a continuation of a previously submitted.
**Materials and methods:** We retrospectively reviewed the records of 29 patients (19 female /10 male) with congenital heart disease which 9 were Tetralogy of Fallot, 8 univentricular hearts with Fontan, 3 with aortic coarctation, 4 ventricular septal defects, 1 truncus, 1 complete atrioventricular defect and 3 with aortic stenosis, all corrected before scoliosis surgery.
All patients were surgically treated with segmental instrumentation by posterior procedures. Spinal cord monitoring and Transesophageal Echocardiography was used in all patients. Cobb, Pedriolle, spirometric values (preoperative (PRE), year and 2 years) and type of heart disease were compared with the Friedman test.
**Results and discussion:** Mean age was 17.3 years. Mean ejection fraction of the left ventricle (LVEF) was 57,6. American Society Anaesthesiologists score was III in 22 patients and IV in 7 and New York Heart Association score ranged was found between I and II. The PRE average Cobb was 65 and postoperative (PO) was 18. The average degree of PRE kyphosis T5- T12 was 27.6 and 22.5 at 2 years. Percentage values of Forced Vital Capacity (FVC) and Forced expiratory volume in the first second (FEV1) showed improvement, being not significant for FVC (p 0,06) and significant for FEV1 (p 0,004). The improvement of FVE1/FVC was not significant. 10 patients had a PO spirometric pattern consistent with moderate restriction, 15 with severe restriction, 2 a mixed pattern and 2 a pattern consistent with normality. There was no relationship between type of heart disease and the spirometric improvement.
**Conclusion:** There was no relationship between the type of heart disease and the evolution of spirometric tests. The spirometric impairment at 1 year could appear to be due to surgery, subsequently improved at 2 years.

## 05AP06-8

### A Comparison of intrathecal diamorphine with systemic analgesia following adolescent idiopathic scoliosis surgery

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**Background and Goal of Study:** Scoliosis surgery can result in severe postoperative pain. The current standard of post-operative pain management consists of opioid-based patient controlled analgesia. To achieve satisfactory pain control, high doses of opioids are administered, resulting in adverse effects such as nausea and vomiting, constipation, pruritus and respiratory depression.
Recently, alternative methods of delivering analgesia have been studied. Intrathecal morphine following spinal surgery is associated with an increased incidence of late respiratory depression. There are currently no studies that compare intrathecal diamorphine with systemic methods of analgesia following scoliosis surgery. The aim of our study is to compare the safety and efficacy of spinal diamorphine with systemic analgesia in patients undergoing adolescent idiopathic scoliosis surgery.
**Materials and methods:** This was a retrospective comparative observational study. Data collection was performed via a review of patient notes. Children under 18 years of age with adolescent idiopathic scoliosis undergoing single stage posterior fusion performed by two surgeons were included. The anaesthetist injected spinal diamorphine with the patient under general anaesthesia prior to the surgical incision. Data collected included: patient demographics, perioperative analgesic requirements and pain scores in recovery and for up to 48 hours postoperatively, estimated blood loss (EBL), side effects, critical care and hospital length of stay, indicators of gastrointestinal function (postoperative number of days needed to establish oral intake and bowel opening). Statistical analysis was performed using a standard t-test.
**Results and discussion:** 60 children were included in the study with 30 having spinal diamorphine and 30 having no spinal diamorphine. Patients in the diamorphine had less opioid consumption and less pain scores in the recovery and for up to 48 hours after surgery. One patient in the spinal diamorphine had respiratory depression and was managed with naloxone boluses without airway intervention.
**Conclusion(s):** Spinal diamorphine provides better analgesia than conventional methods following scoliosis surgery. Future dose dependent studies are needed to find out the optimum dose of intrathecal diamorphine which would maximise the benefits without increase in side effects.

## 05AP06-9

### Anesthesia in patients of aromatic L-amino acid decarboxylase (AADC) deficiency for MRI scan and stereotactic surgery

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**Background:** Aromatic l-amino acid decarboxylase (AADC) deficiency is a rare autosomal recessive disorder. The AADC enzyme plays an important role in the synthesis of monoamine neurotransmitter like dopamine and serotonin. Lack of the AADC enzyme would lead to reduced concentration of biogenic amines and metabolites in cerebrospinal fluid and result in autonomic dysfunction and movement disorder with symptoms such as oculogyric crises, limb dystonia, neurologic dysfunction and impaired movements. Hemodynamic instability, poor thermoregulation, and hypoglycemia due to AADC may seriously influence anesthetic managements.
**Case report:** Eight patients with AADC deficiency were enrolled in the study. All patients were older than 24 months and indicated for stereotactic surgery. They received general anesthesia (GA) for both MRI scan and stereotactic surgery within a week interval. All patients tolerated GA without complications. The average duration for MRI scan was 93 minutes, and 521 minutes for stereotactic surgery. During the MRI scan, only 1 patient received vasoactive agent once, and the hemodynamics were stable in other patients. Extubation were performed right after the procedure, and all patients were sent to intensive care units (ICU) for further observation. No respiratory complications were noted throughout the ICU stay. For the stereotactic surgery, 4 patients needed inotropic support. During the surgery, neither hypoglycemia nor hypo- or hyperthermia were detected. All patients were sent to ICU for postoperative care, and extubation were performed smoothly.

**Discussion:** Due to reduced concentration of catecholamine and intact parasympathetic activity, anesthetic management in AADC deficiency patients is challenging. In our case series, hemodynamics of AADC deficiency patients are stable during GA for minor procedure such as MRI scan. However, in major surgeries, inotropic or vasoactive support may be necessary. Our study shows that GA can be conducted safely in AADC deficiency patients with adequate monitoring.

**Learning points:**

1. For AADC deficiency patients, anesthetic management is a big challenge due to autonomic dysfunction and movement disorder.
2. Inotropic or vasoactive agents might be needed in some AADC deficiency patients for major surgery.
3. With adequate monitoring, general anesthesia can be conducted safely in AADC deficiency patients.

## 05AP06-10

### Anaesthesia and outcomes following neonatal congenital diaphragmatic hernia (CDH) repair

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**Background:** Mortality following surgical correction of neonatal CDH remains significant. Volume overload, transfusion related lung injury, baro-trauma, oxygen toxicity and duration of anaesthesia are anaesthetic factors postulated to affect outcome, as is treatment with the foetal endotracheal occlusion procedure (FETO). We reviewed the experience of a single centre over a six-year period.

**Materials and methods:** Records of neonates with left sided CDH undergoing first surgical repair between 2009 - 2015 were reviewed. Right sided CDH and major congenital anomalies were excluded. The day 1 best oxygenation index ($OI_{BEST}$), and OI just before surgery ($OI_{PRE}$) and at 1, 6, 12, and 24 hours after surgery ($OI_{1HR}$, $OI_{6HR}$, $OI_{12HR}$, $OI_{24HR}$) were calculated.

**Results and discussion:** 37 neonates, were studied [22 male, mean gestation (SD) 36.6 (2.8) weeks]. Of these, 20 (54.1%) had an antenatal FETO. 6 died. The relative risk of death for the FETO vs. non-FETO treated babies was 4.24.

The change in lung oxygenation index, delta OI, was calculated subtracting $OI_{PRE}$ from post-operative OI at 4 time intervals. $OI_{1HR}$, $OI_{6HR}$, $OI_{12HR}$, and $OI_{24HR}$ were independently predictive of death with ROC AUC values of 0.811, 0.795, 0.773 and 0.970 respectively. Neither the $OI_{BEST}$, nor $OI_{PRE}$ was predictive of death. $OI_{24HR}$ best correlated with poor survival. Volume of crystalloid and colloid given during anaesthesia standardised to body weight and duration of anaesthetic did not correlate with the change in oxygenation index i.e. Delta $OI_{24HR}$ [mean (SD) 1.62 (5.03)]. Delta $OI_{24HR}$ also did not correlate with peak end expiratory pressure (PEEP), peak inspiratory pressure, respiratory rate (RR) per min, arterial oxygen pressure or duration of anaesthesia. The (anaesthesia/surgery) case duration was also not significantly different between survivors and non-survivors.

For patients receiving blood transfusion, FFP or gelofusine during surgery, the relative risk of death was 2.21, 0.73, 0.27 respectively. None received platelets. The Delta $OI_{24HR}$ did not correlate with the volume of blood transfused.

**Conclusion(s):** Amongst the anaesthetic factors studied, only blood transfusion during surgery irrespective of the volume given was linked to a 2-fold increase in risk of death. Other factors related to poorer outcome included poorer $OI_{24HR}$ , and FETO treatment. Whether these associations are causative or markers of disease severity remains to be demonstrated.

## 05AP06-11

### Anaesthetic management of a patient with myofibrillar myopathy and Stickler syndrome for scoliosis surgery

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Myofibrillar myopathy (MFM) is a rare genetic disorder and impacts cardiac, skeletal, and smooth muscles. This condition also has have susceptibility for malignant hyperthermia (MH) and rhabdomyolysis.[1,2] Stickler Syndrome (SS) is a systemic disorder that affects primarily joints, eyes and ears. The combination of these pathologies makes for a complex anesthetic management.

**Case report:** 14-year-old patient with severe scoliosis for surgical correction. Medical history: MFM; SS suspicion; restrictive lung disease; severe aortic dilatation and regurgitation; pectus excavatum. There was no difficulty securing the airway. The patient presented supraventricular tachycardia during the surgery that resolved after an esmolol bolus. After eight hours of surgery, the patient was left at intensive care unit. Two hours later, she was extubated but required Noninvasive ventilation due to respiratory acidosis.

**Discussion:** SS and MFM have specific implications. Airway management was cautiously planned. She had previous cleft palate correction and cervical arthrodesis, but deep inhalational induction was not an option because of MFM. Prone position is associated with a potential for decreased cardiac output, while the presence of pectus excavatum added the possibility of direct external compression of cardiac chambers. Dependent areas were protected. This is vital in SS because of a higher risk of lesion due to joint hypermobility. Positioning of the face and eyes is also very important; due to the risk of retinal detachment.[2] Strategy to prevent blood loss include tranexamic acid and intraoperative cell salvage machine. Monitoring temperature, ETCO2, and neuromuscular blockade are mandatory in MFM because of MH susceptibility [2]. A trigger free anaesthetic is indicated[1,2]. Use of propofol appears to be safe in this disease[1].

**References:**

1) Latham, G. J, Anesthetic considerations in myofibrillar myopathy. Pediatric Anesthesia 2015;25:231-8.

2) Peter S. Stickler Syndrome: Clinical characteristics and diagnostics criteria. Am.J.Med.Genet A. 2005;138:199- 207.

**Learning points:** SS is characterized by facial abnormalities, ocular and joint problems. Airway management should be planned and pay special attention to padding and positioning. MFM is a rare myopathy. Multiple anesthetic considerations exist, including cardiomyopathy, restrictive lung disease, airway obstruction, and positioning difficulties in the presence of muscle contractures.[1,2].

## 05AP07-1

### Postoperative analgesic requirement in pediatric patients undergoing groin surgery according the type of anesthesia: combined vs general

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**Background and Goal of Study:** Analyze the postoperative analgesic requirement in pediatric patients according they were subjected to a combined anaesthetic technique (General + ilioinguinal-iliohypogastric nerve block ultrasound) or to a general anesthesia
**Materials and methods:** We performed a prospective study over pediatric surgical patients during 2014. 100 children between 2 and 9 years undergoing elective groin surgery (cryptorchidism, inguinal hernia repair, and hydrocele) were entered into the study. 50 under a combined anaesthetic technique (cryptorchidism-33, inguinal hernia repair-15, and hydrocele -2) and 50 under a general anesthesia (cryptorchidism-35, inguinal hernia repair-15, and hydrocele-2). There were no statistically significant differences between groups.
A comparative analysis evaluating Pre, intra, and post-operative data according the anesthetic technique was made.
To correlate different variables we used the chi square of Pearson for independent variables and Kruskal-Wallis test for continuous variables. Significance at $p<0.05$
**Results and discussion:**

| DATA | NERVE BLOCK DONE | NO NERVE BLOCK | SIGNIFICATION (P=) |
|---|---|---|---|
| PREOPERATIVE | | | |
| Middle Age | 4.74 years | 4.86 years | 0.83 |
| Middleweight | 20.74 Kg | 21.43 Kg | 0.8 |
| Heart Rate | 99.1 | 81.8 | 0.54 |
| Middle Systolic blood pressure | 101.88 | 104.9 | 0.86 |
| INTRAOPERATIVE | | | |
| Middle Systolic blood pressure post-Incision | 90.6 | 92.6 | 0.6 |
| Heart rate post-incision | 98.6 | 99.5 | 0.8 |
| Middle surgery time | 30 min. | 29.5 min | 0.8 |

*[Pre and intraoperative data]*

| DATA | NERVE BLOCK DONE | NO NERVE BLOCK | SIGNIFICATION (P=) |
|---|---|---|---|
| Recovery Time | 11.9 min | 20.27 min | <0.05 |
| WONG VISUAL SCALE=0 | | | |
| 1H after surgery | >80% | <18% | <0.05 |
| 2H after surgery | 94% | 42% | <0.05 |
| 4H after surgery | 100% | 68.5% | <0.05 |
| Discharge | 96% | 56% | <0.05 |
| NEED FOR RESCUE ANALGESIC | | | |
| Into the first 4H | 0 | 35 | <0.05 |
| Middle number of rescues | 0 | 1.14 | <0.05 |

*[Postoperative data]*

**Conclusion(s):** Patients anesthetized by a combined technique (General + ilioinguinal-iliohypogastric block) had significantly less postoperative pain and required less analgesic rescue than those subjected only to a general anesthesia.

## 05AP07-2

### Hospital Stay in pediatric patients undergoing groin surgery according the type of anesthesia: combined vs general

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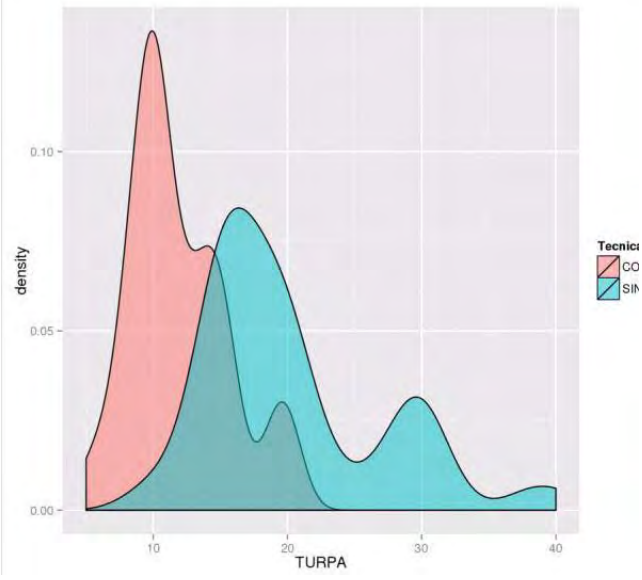
**Background and Goal of Study:** Analyze the hospital stay in pediatric patients according they were subjected to a combined anaesthetic technique (General + ilioinguinal-iliohypogastric nerve block ultrasound) or to a general anesthesia
**Materials and methods:** We performed a prospective study over pediatric surgical patients during 2014. 100 children between 2 and 9 years undergoing outpatient elective surgery in the groin (cryptorchidism, inguinal hernia repair, and hydrocele) were entered into the study. 50 under a combined anaesthetic technique (cryptorchidism-33, inguinal hernia repair-15, and hydrocele -2) and 50 under a general anesthesia (cryptorchidism-35, inguinal hernia repair-15, and hydrocele-2). There were no statistically significant differences between groups.
A comparative analysis evaluating Pre, intra, and post-operative data according the anesthetic technique was made.
To correlate different variables we used the chi square of Pearson for independent variables and Kruskal-Wallis test for continuous variables. Significance at $p<0.05$.
**Results and discussion:**

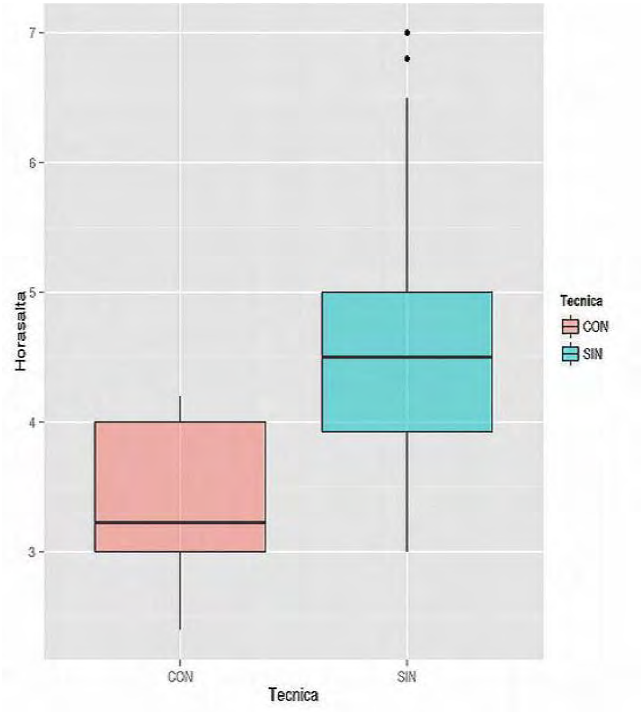
| DATA | NERVE BLOCK DONE | NO NERVE BLOCK | SIGNIFICATION (P=) |
|---|---|---|---|
| PREOPERATIVE | | | |
| Middle Age | 4.74 years | 4.86 years | >0.05 |
| Middleweight | 20.74 Kg | 21.43 Kg | >0.05 |
| Premature Birth | 2 cases | 2 cases | >0.05 |
| INTRAOPERATIVE | | | |
| Middle surgery time | 30 min. | 29.5 min | >0.05 |
| Intraoperative Complications | 0 | 0 | >0.05 |

*[Pre and intraoperative data]*




*[Stay in Recovery room]*

The average time in the recovery room was 11.9 minutes when a nerve block was made and 20.27 minutes if no nerve block ($p<0.05$).




*[Hospital Stay according the type of anesthesia]*

Mean hospital stay was of 3.37H if a nerve block was made, and of 4.58H if was not done ($p<0.05$).

**Conclusion(s):** Performing a ilioinguinal-iliohypogastric block in pediatric patients undergoing groin surgery significantly decreases the stay in the recovery room and hospital stay.

## 05AP07-3

### Sevoflurane usage during automated low flow anesthesia in children with the FLOW-i's AGC

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**Introduction:** Low flow anesthesia has been slow in finding its way into paediatric anesthesia, with no reports on fresh gas flows (FGF) well below 1 L/min. Recently, the FLOW-i's automated low flow feature (AGC) was introduced in our practice (Maquet, Solna, Sweden). AGC exponentially reduces FGF to 300 mL/min [1]. We retrospectively analyzed FGF and sevoflurane usage (Vsevo) with AGC in children undergoing circumcision.

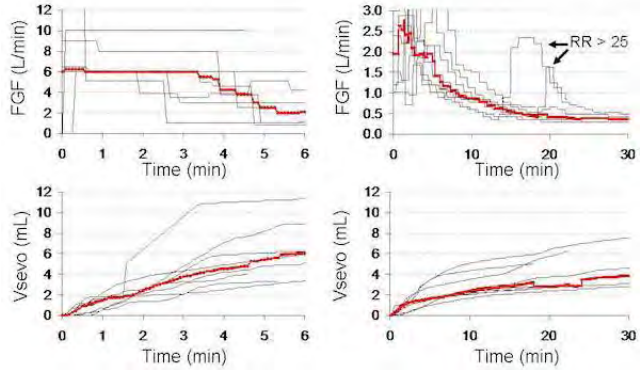
**Methods:** After IRB approval, we reviewed routinely collected RUGloop files of paediatric patients (pts) who had undergone circumcision (by the same surgeon) in November 2015 with the FLOW-i. These files contain monitoring and machine data, sampled every 5 s. Anesthesia was always induced by facemask, starting with 8% sevoflurane in a high $O_2/N_2O$ FGF using the circle system with an HME filter and 4 $cmH_2O$ of pressure support ventilation (PSV). After obtaining IV access and laryngeal mask (LMA) placement, PSV was continued (5 - 6 $cmH_2O$), and AGC started after the target inspired $O_2$ % ($F_IO_2$) and target end-expired ($F_A$) sevo % had been entered. Data retrieved were pt demographics, FGF, Vsevo, AGC target $F_IO_2$ and $F_A$sevo, and the resulting $F_IO_2$, $F_A$sevo, $F_AN_2O$, and age adjusted MAC (minimum alveolar concentration). Data are presented as median (quartile).

**Results:** Fig 1 & 2. Data from 8 pts were retrieved. Age was 2.8 (1.5 - 4.3) years, weight was 16.5 (15.0 - 17.5) kg. AGC target settings were 37.5 (35 - 40)% for $F_IO_2$ and 2.2 (2.2-2.8)% for $F_A$sevo.

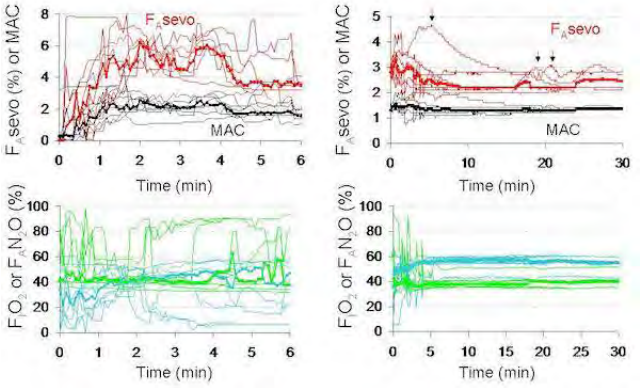
**Discussion:** Modern technology can bring low flow anesthesia within the realm of routine paediatric anesthesia practice: during maintenance, AGC decreases FGF to 300 mL/min in paediatric pts during PSV via a LMA, unless respiratory rate increases above 25/min.

**Reference:**

1. Carette R. J Clin Monit Comput. 14/6/2015, pp 1-6. PMID: 26072157




*[Figure 1. Fresh gas flows (FGF, upper panes) and sevoflurane usage (Vsevo, mL liquid, lower panes) during mask induction (left panes) and maintenance with AGC (right panes). Note different time and FGF scales between panes. Thick red line = median, thin black lines = individual patient data. Arrows right upper pane: AGC stops (FGF is increased) if RR (respiratory rate) > 25/min]*




*[Figure 2. End-expired sevo % ($F_A$sevo, red) or MAC (black) both in upper panes) and $F_AN_2O$) (blue) or inspired $O_2$% ($F_IO_2$, green) (both in lower panes) during mask induction (left panes) andmaintenance with AGC (right panes). Note different scales between panes. Thick line = median, thin lines = individual patient data. ↓ = target $F_A$sevo reset]*

## 05AP07-4

### Gastric carbon dioxide concentration following bag and mask ventilation in children

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**Background and Goals of Study:** Unrecognized placement of an endotracheal tube (ETT) in the oesophagus is a potentially life threatening complication of tracheal intubation. Correct ETT position is confirmed by presence of carbon dioxide ($CO_2$) in exhaled gas. Following bag-mask ventilation in children a high and deceptive level of end tidal (ET) $CO_2$ can be present in the expired gas following inadvertent oeosophageal intubation. We sampled gastric gas $CO_2$ levels in anaesthetized children following bag-mask ventilation at induction to demonstrate this possibility.

**Materials and methods:** Twenty-one children were recruited. Anaesthesia was induced and child bag-mask ventilated using a Jackson-Rees T-piece circuit. Intravenous lines were inserted and the trachea intubated. The airway management provider was usually a resident supervised by senior. After securing the airway mechanical ventilation was started and a size 10 suction catheter was passed into the stomach via mouth. The $ETCO_2$ monitoring line was disconnected and attached to the open end of the suction catheter. Gastric gas was sampled for 10-seconds and displayed. The level of gastric $CO_2$ was measured from the $ETCO_2$ trace.

**Results and discussion:** Median (range) age was 14(0-60) months, and weight was 9(3-25) kg. Children were bag-mask ventilated for 4(1-20) minutes with fresh gas flow rate of 6(3-18) L/min. Gastric gas could be sampled in all cases. The mean (range) level of gastric $CO_2$ detected was 29 (12-52) mmHg.

The child with highest level of gastric $CO_2$ was bag-mask ventilated for 10 minutes.
Significant levels of $CO_2$ are found in the stomach following bag- mask ventilation in young children. These levels are sufficiently high to cause confusion when using the $ETCO_2$ trace as evidence of successful tracheal intubation. Holding a face mask and ventilating using a Jackson-Rees circuit can result alveolar gas rich in $CO_2$ entering the stomach. Presence of volatile agent in the gas was also consistence with an alveolar origin. The longer and more difficult the period of manual ventilation the greater the amount that accumulates.
**Conclusion:** Significant amounts of $CO_2$ often in excess of 30 mmHg may be initially detected following oesophageal intubation in children as a result of bag-mask ventilation. Therefore presence of $CO_2$ to confirm correct ETT position is not totally reliable in children and the $ETCO_2$ trace should be confirmed over several ventilator cycles.

## 05AP07-6

### Choice of anesthetic agents for pediatric anesthesia: a Belgian survey of current practice

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**Background and Goal of Study:** A combination of sevoflurane and nitrous oxygen (N20) is widely used in pediatric practice. An intravenous (IV) access is not required prior to induction, the second gas effect facilitates induction and both are the least irritating volatile agents. Currently, the use of N20 is under debate and during recovery from sevoflurane anesthesia emergence agitation may occur.(1) Therefore, the purpose of this survey was to investigate choice of anesthesia for children in Belgian hospitals. Furthermore we analysed if use of N20 is lower in academic hospitals.
**Materials and methods:** In May 2015, the chairman of all 94 departments of anesthesia in Belgium were asked to participate in an online survey. Non-responders were reminded weekly (4 times) and contacted one last time by post. Descriptive statistics were used to summarize numeric responses.
A chi-square test for independence was used to test for possible association between use of N20 or air and type of hospital.
**Results and discussion:** During the period May - Oct 2015, 70 departments responded (74,5%). Anesthesia in children under 1 year old was performed in 68 of 70 responding hospitals and above
1 year old in all responding hospitals. IV induction is the standard in 1 hospital for children under
4 years old and in 11 hospitals for children over 4 years old (15%). For maintenance, all hospitals used inhalational agents. Use of N20 was highest during induction (34, 39 and 33 hospitals for respectively children aged <1 yr, 1 - 4 yr and >4 yr) and dropped during maintenance (respectively 27, 32 and 32 hospitals). N20 was used in only 2 of 7 responding academic hospitals (28%) and in 37 of 64 general hospitals (57%). However, at a significance level of $\alpha = .1$ no association could be shown: $X^2 = 2.476$ ($N = 71$), $p = .115$.
**Conclusion:** Inhalational induction and maintenance of anesthesia is still standard practice in Belgian pediatric anesthesia. However, to induce anesthesia, 15% of responding hospitals choose an IV agent in children above 4 years old. Use of N20 is highest during induction and in patients between 1 and 4 years old. Furthermore, N20 is used in only 28% of academic hospitals versus 57% of general hospitals. However, no statistical significance could be shown due to the small number of academic hospitals.
**References:**
1. Costi D, et al. Effects of sevoflurane versus other general anaesthesia on emergence agitation in children. *The Cochrane Database Syst Rev.* 2014 Sep 12;9:CD007084

## 05AP07-7

### Sedation for paediatric magnetic resonance imaging using propofol with or without ketamine at induction - a prospective randomized double blinded study

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**Introduction:** Deep sedation using propofol has become a standard technique in children.This study aims to compare the clinical effects of adding ketamine at induction prior to propofol infusion in children undergoing elective magnetic resonance imaging (MRI) in a prospective double-blinded randomized trial.
**Methods:** After obtaining approval from the independent ethics committee, children aged from 3 months to 10 years scheduled as outpatients for elective MRI in deep sedation were included. Exclusion criteria were painful procedures during the same sedation and the need for tracheal intubation or ventilator support. Children were randomized into 2 groups, receiving either 1 mg/kg ketamine at induction, starting propofol infusion at a rate of 5 mg/kg/min (Group KP) or starting propofol infusion at a rate of 10 mg/kg/min without ketamine (Group P). Sevoflurane inhalation or intravenous propofol boluses were used at induction. Quality of induction, quality of immobilization during MRI, quality and time to full recovery (Adrete score = 10), postoperative nausea and vomiting (PONV), emergence delirium using the PAED score, vital sign parameters from the electronic patient data management system and behavioural changes using the posthospitalization behavioural questionnaire (PHBQ) at day 7, 14 and 28 after sedation were evaluated. Patients and parents as well as anaesthetists, MRI and post-sedation personnel involved were blinded. Data given as median (range).
**Results:** In total, 347 children aged 45(3-132) month, ASA I,II or III(141/188/18), weighing 15.6 (5.3-54) kg were included. The KP group showed significantly shorter recovery time (38 (22-65) vs. 54 (37-77) min,$p < 0.001$), better quality of induction, wake up behaviour and better cardiopulmonary stability but higher incidence of movement during imaging, predominantly after 45 min sedation time(14 vs.33), and PONV(0 vs.4). There were no significant differences in respiratory side effects, cardiovascular compromise, emergence delirium or behavioural changes until day 28 days between both groups.
**Conclusion:** Both sedation concepts proved reliable with few adverse events. Additional ketamine at induction showed advantages at induction and during recovery. However, movement disturbing MRI acquisition was more frequent. In clinical practice, however, adapting the propofol infusion rate can prevent movement during prolonged MRI examinations. PONV, although a rare complication, occurred more often after ketamine.

## 05AP07-8

### Sedation as a unique technique for magnetic resonance imaging (MRI) in infants: is it possible?

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**Background:** General anesthesia (GA) is the technique of choice for MRI in children, which is a frequent diagnostic step to define cancer staging and treatment options. Upper respiratory tract infection (URI) is a condition that generally postpones exams under general anesthesia, since complications such as laringospasm can occur. MRI procedures are usually performed outside operating room environment. Sedation seems to be a good and safe alternative for such cases.
**Case report:** A three-year-old, 15kg child diagnosed with retinoblastoma was submitted to preoperative skull and orbit MRI. Pre anesthetic evaluation revealed URI, which would prevent the procedure. As the exam could not be delayed, anesthesia was performed solely with sedation. It started with oral Midazolam 0.5mg/Kg as premedication 30 minutes prior to MRI execution. Clonidine 3μg/Kg was injected intravenous (IV), immediately after obtaining the venous access. The child fell asleep. While positioning and monitoring the child with capnography, pulse oximetry and blood pressure, a slight awaken-

ing was noticed. Then, propofol 1mg/kg plus lidocaine 1mg/kg were IV injected. This amount was enough to improve sedation and to ensure that the child would breath spontaneously, allowing procedure execution. Oxygen saturation remained 100%, avoiding airway manipulation. The MRI exam lasted 30 minutes and the child immediately woke up by injecting Flumazenil 30μ/kg IV. No complications were observed.
**Discussion:** Despite the apparent advantage of GA for MRI scanning, as it works independent of a child's ability to cooperate, inducing GA in MRI requires a fully equipped anesthesia workstation in order to guarantee patient safety (1). Concerning children and MRI, the management of the child with URI is directed at minimizing secretions and avoiding stimulation of a potentially sensitive airway. Considering the noise and tube narrowness, goals of sedation for MRI include anxiety control, minimization of psychological trauma and optimization of amnesia, with minimal ventilatory impairment, which is a challenge in infants (1).
**Reference:**
1. Schulte-Uentrop L, Goepfert MS. Anaesthesia or sedation for MRI in children. *Curr Opin Anaesthesiol*.**23**:513-7.
**Learning points:** We aimed to call attention for the possibility of performing MRI under safe sedation without airway manipulation in infants.

## 05AP07-9

### Perception of surrogate consent for clinical research among relatives of children undergoing surgical procedures in a tertiary care university hospital in Egypt

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**Background and Goal of Study:** Recruitment of children undergoing surgical procedures is essential for medical research without violating their legal rights. This protection is established by proxy consent. Little is known about attitudes among children relatives towards surrogate consent in our country. This study was designed to measure perception and willingness to provide surrogate consent for clinical medical research among children relatives in our hospital and to assess possible factors that influence their attitudes.
**Materials and methods:** This cross-sectional study was conducted in Cairo University pediatric hospital from January to March 2015.Participants were first degree relatives of children scheduled for surgical procedures. A three parts questionnaire was used for data collection. Sociodemographic data were obtained first. The second part tested the general perception towards medical research by aid of a 5 items "Research Attitudes Questionnaire" (RAQ); each item was a 5 points scale (1.strongly agree, 2.agree, 3.neutral, 4.disagree, 5.strongly disagree) giving a possible score from 5 to 25; the lower the score the better the favorability. The third part was 2 hypothetical scenarios (a blood draw study and a drug trial).
**Results and discussion:** 250 participants (18- 49 years) were enrolled in this study, 205 mothers(82%), 45 fathers(18%);111(44.4%) were uneducated and 139(55.6%) were educated with different levels. General perception towards medical research was favorable with a mean score 12.3 (1.4). Relatives were two times more likely to agree about participation of their children in the hypothetical blood draw study (122;48.8% accept versus 50;20% disagree) as they perceived it as low risk, compared to the drug trial (52;20.8% accept versus 142;56.8% disagree) which they perceived as high risk. Participants with secondary school (or lower) education were 4 times more likely to refuse recruitment of their child in a drug trial compared to diploma or master(OR 4.2, P 0.02). There were no associations between person's own view about surrogate consent and age or gender.
**Conclusion(s):** Level of perception of the importance of clinical research was high among our children relatives but the majority of them refused participation of their children in invasive clinical trials. Level of education and risk degree were the main factors in our survey influencing children relatives' agreement to participate in a clinical research.

## 05AP07-10

### Pediatric anesthesia outside of the operating room: a survey of current practice in Belgian hospitals

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**Background and Goal of Study:** Anesthesia for gastro-intestinal, radiological and other procedures outside of the operating room for pediatric patients are a fast growing division of medical service. However, there is a growing concern that general anesthetics may cause neurotoxic changes in the developing brain that lead to adverse neurodevelopmental outcomes later in life. Moreover, occupational exposure to waste anesthetic gases (WAG's) has been associated with a broad spectrum of adverse health outcomes, ranging from parkinson's disease to teratogenicity and congenital anomalies. Thus, we conducted a survey of the current use of intravenous and volatile anesthetics and gas scavenging systems outside of the operating room for pediatric anesthesia in Belgian hospitals.
**Methods:** In May 2015, the chairmen of all 94 departments of anesthesia in Belgium were invited by email to participate in the present survey. Reminders were sent to non-responders weekly (4 times). The remaining non-responders were contacted one last time by post with a written questionnaire identical to the online survey. Descriptive statistics were used to summarize numeric responses.
**Results and discussion:** During the period May 2015 - October 2015, responses were received from 71 departments (response rate 75,5%).
Procedures under general anesthesia in pediatric patients outside of the operating room are performed in 43 responding hospitals (60,5%). Volatile anesthetics (sevoflurane and/or N20) were used outside of the operating room in 33 responding hospitals (46,5%). Gas scavenging systems connected to the breathing system outside of the operating room were only available in 6 of these hospitals (18%). In 46 hospitals (65%), nitrous oxide/oxygen sedation is utilized by non-anesthesiologists. In only 5 hospitals (11%), these gas mixtures are definitely administered with a gas scavenging system connected to the breathing system. In 8 hospitals (17,5%), data are missing and in 33 hospitals (71,5%), these gas mixtures are not administered with a gas scavenging system connected to the breathing system.
**Conclusion:** Apparently, pediatric procedures under general anesthesia are also in Belgium increasingly performed outside of the operating room. More importantly, occupational exposure to waste anesthetic gases (WAG's) outside of the operating room is a huge health risk in Belgian hospitals.

## 05AP07-11

### Effects of isoflurane on the expression of NR2B during the growth and development of the rat brain

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**Background and Goal of Study:** The present study was designed to evaluate the effects of isoflurane on the expression of N-methyl-d-aspartate receptor subtype 2B (NR2B) during the growth and development of the central nervous system (CNS), and explore the potential mechanism of isoflurane on the growth of the CNS in rats.
**Materials and methods:** Primarily cultured rat cortical and hippocampal neurons were obtained from the 18-day-old embryos. 2% isoflurane with varied concentrations (100μM, 50μM, 10μM and 0μM) of ifenprodil or without it were blown for 6 hours at day 2, 5 and 7 after cortical cell culture and 5, 7 and 10 days after hippocampal cell culture. LDH and MTT were measured for assessment of cell viability. β tubluin-III was stained to measure the length and number of the neural processes.
The expression of NR2B subunits in these neurons during varied developmental stages were detected by immunohistology staining and Western Blot. 2% isoflurane (2 h per day) was administered to neonatal rats from postnatal (PN) day 5 to 9 consecutively. Brain tissues were harvested at PN day 7, 10, 14 and 18, of which 50% were used for NR2B immunohistological staining, and the remaining were used for Western Blot.
**Results and discussion:** NR2B expression in primarily cultured cells was increased with days prolonging, and reached the peak at day 7 after cortical cell culture and day 10 after hippocampal cell culture. The expression of NR2B was decreased at day 5 after cortical cell after isoflurane treatment, but

the cell viability was increased. The length and the number of the neural processes were also increased at the same time. The MTT value of cortical neurons was upgraded significantly at day 5, while the MTT value of hippocampal neurons was descended significantly at day 10. Interestingly, the length and the number of the neural processes decreased both in cortical and hippocampal neurons when ifenprodil (50$\mu$M) was used together with 2% isoflurane. The same change was also observed in the expression of NR2B subunits. The expression of NR2B subunits was increased with days prolonging, which was more prominent in hippocampal cells than that in the cortical cells.
**Conclusion(s):** Based on the above data, we could assume that the clinical concentration of isoflurane can be used safely for obstetric and neonatal patients.

# Neuroanaesthesiology

## 06AP01-1

### Hysteresis observed in the onset and offset of propofol-induced unconsciousness in surgical patients suggests that neural inertia exists in humans

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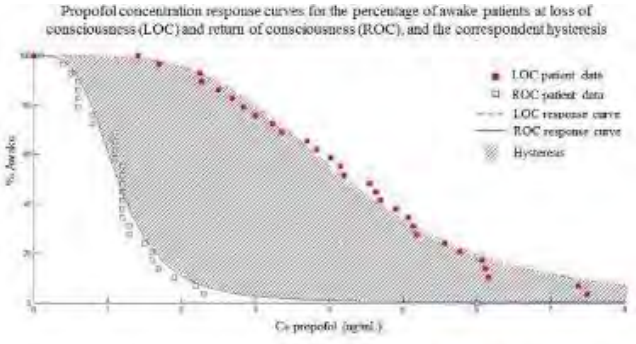
**Background and Goal of Study:** The concepts of hysteresis and neural inertia were introduced in relation to the concentrations at which consciousness is lost and regained with anesthetics. Mashour stated that neural inertia was demonstrated in two animal species[1] but not in humans[2]. In a prospective study we carefully identified the moments of loss and recovery of consciousness (LOC and ROC) and compared the calculated propofol concentrations at which they occurred to assess hysteresis.
**Materials and methods:** Under IRB approval, 29 patients undergoing surgery received fentanyl (3ug/kg) followed by 1% propofol at 3.3ml/kg/h until LOC (modified OAAS score of 0). Propofol, fentanyl and remifentanil effect-site concentrations (Ce) were calculated using Schnider's, Shafer's and Mintos's PK models, respectively. At LOC the amount of propofol given and the predicted Ce were noted and the pump (Fresenius Orchestra) was switched to effect-site TCI. Propofol was titrated to a BIS of 40-60. Remifentanil by TCI was started 30min after LOC, titrated during surgery. At the end of surgery it was set at a Ce of 2ng/ml and propofol was stopped. The patient was called every 10sec. At eye opening (ROC) propofol Ce was recorded. Dose response curves were generated for propofol Ce at LOC and ROC and hysteresis assessed as done by Friedman[1]. Data are mean±SD. Statistics used Spearman's rank correlation coefficient (R).
**Results:** At LOC, propofol and fentanyl Ce's were 4.3±1.6ug/ml and 3.4±0.5ng/ml and at ROC, propofol Ce was 1.13±0.48ug/ml and remifentanil Ce was 2,0±0ng/ml. Figure 1 shows the hysteresis curve. Neural inertia was 317.




| | EC50 | 95% C.I. | Hill Slope | 95% C.I. | Top | 95% C.I. | $R^2$ |
|---|---|---|---|---|---|---|---|
| LOC | 4.22 | [3.98, 4.46] | -4.05 | [-4.98, -3.14] | 100 | [94.37, 105.6] | 0.9871* |
| ROC | 1.14 | [1.05, 1.22] | -3.70 | [-4.69, -2.70] | 100 | [91.24, 108.8] | 0.9428* |

Best fit-parameters for the LOC and ROC generated response curves. *p<0.001

*[Neural Inertia in Humans]*

**Conclusion(s):** Our dose response curves for propofol predicted concentrations at loss and return of consciousness, exhibit hysteresis similar to that showed in animal species. The opioid concentrations at LOC and ROC were equipotent. Our results may be the first to provide evidence to suggest that neural inertia exists in humans.
**References:**
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2. Tarnal V. J Neurosurg Anesthesiol.2015-Aug-13
**Acknowledgements:** FCT-UID/SEM/50022/2013;SFRH/BD/98915/2013

## 06AP01-2

### Cerebral oxygenation monitoring during post-cardiac arrest status epilepticus reflects intact neurovascular coupling

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**Background and Goal of Study:** About one third of out-of-hospital cardiac arrest (OHCA) patients experience a status epilepticus (SE), associated with an increased mortality. In animal models, increased cerebral metabolic demands, exceeding cerebral perfusion, were described during SE (1), but so far no clinical data reported on post-CA SE. The aim of this study was to investigate cerebral oxygenation (SctO2), by NIRS, during SE.
**Materials and methods:** With IRB approval, we prospectively applied bilateral NIRS (Casmed ForeSight®) and bilateral BIS-EEG (Covidien BIS-Vista®) monitoring at ICU admission in all consecutive post-CA patients, treated with therapeutic hypothermia (33°C for 24hours). SctO2 monitoring was maintained over a 48hrs period, divided in 3 time frames (6-12h, 18-24h and 36-48h) for further analysis. Raw BIS-EEG data of all time frames were analysed by an experienced neurophysiologist for the presence of slow diffuse (SD) EEG pattern or SE. We compared SctO2 values of patients with SE in one or more time frames to SctO2 values of patients with persisting SD pattern. Mann-Whitney U test was used for statistical analysis.
**Results and discussion:** Combined SctO2-EEG data of 75 postCA patients were analysed. In 14 patients SE was present during one or more time frames, whereas 16 patients revealed a persisting SD EEG. Only one patient with SE survived compared to 13 patients with SD EEG. No significant differences in median SctO2 were observed between patients with SE and with SD EEG rhythm during all time frames (6-12h: 64% (61-70%) vs 67% (63-69%); 18-24h: 69% (65-76%) vs 67% (65-73%); 36-48h: 71.5% (70-78%) vs 71.5% (69-83%). Nevertheless, in the earliest time frame (started 6 hours after ICU admission) a trend towards lower SctO2 values was detected during SE. Overall, we could confirm the already reported increase in SctO2 over the first 48hrs postCA, observed in both groups.
**Conclusion(s):** This first study was not able to show significant differences in cerebral oxygenation between patients with and without SE. Although the onset of SE is reported to increase cellular oxygen demand, postCA patients might have sufficient cerebral reserve to cope with this request. Further research on the onset of SE, and its influence on cerebral oxygenation, could reveal more significant results.
**References:**
1. Schwartz TH et al, Epilepsy Curr 2007;7:91-94

## 06AP01-3

### S100B and neuron specific enolase (NSE) value for prediction of in-hospital mortality for patients with severe traumatic brain injury

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**Background and Goal of Study:** Measurement of neuromarkers is easy but not widely used diagnostic method. The value of neuromarkers for predicting the outcome of traumatic brain injury (TBI) is not clear enough. The aim of this study was to evaluate the value of S100B and NSE for prediction of in-hospital mortality for patients with severe TBI.
**Materials and methods:** A prospective study was held in Lithuanian University of Health Sciences Kaunas Clinics, Anesthesiology clinic. Serum of 46 patients with severe TBI was analyzed for S100B and NSE neuromarkers. Neuromarkers were measured at hospital admission (N1) and after 24 (N2), 48 (N3) and 72 (N4) hours. Outcomes were analyzed at hospital discharge and the influence of neuromarkers for in-hospital mortality was evaluated using ROC curves. Patients with absence of measurements were excluded from the study. Nonparametric tests were used for statistical analysis at $p \leq 0.05$. Approval of Regional bioethics committee was obtained before study initiation.
**Results:** 46 patients were involved into the study. There were 11 women and 35 men. The average age was 55.33 ± 16.8 years and there was no significant difference between women and men. Statistically significant differences were found comparing N1-N3, N1-N4, N2-N4, N3-N4 measurements of S100B and N1-N2, N1-N3, N1-N4, N2-N4 measurements of NSE. Using ROC curves analysis specific values of breaking points were found for in-hospital mortality prediction. In-hospital mortality was significantly higher when S100B was N1 >22.5 pg/ml, N2 >128.5 pg/ml, N3 >27.04 pg/ml, N4 >112.06 pg/ml and NSE was N2 >7.97 μg/l, N3 >5.8 μg/l, N4 >28.6 μg/l. N1 measurement of NSE had no statistically significant difference.
Statistically significant difference among the survivors and in-hospital mortality was found in N1, N2, N3 of S100B measurements and in N2, N3 of NSE measurements.
Moreover, S100B values N2 >128.5 pg/ml and N3 >27.04 pg/ml increased the risk of in-hospital mortality 18.174 and 7.67 times respectively as well as NSE N2 >7.97 μg/l and N3 >5.8 μg/l increased the risk 5.4 and 21. 671 times respectively.
**Conclusion:** S100B and NSE can be used for prediction of in-hospital mortality for severe TBI patients. However, the maximum value for prediction can be obtained if neuromarkers are measured after 24 and 48 hours after hospital admission.

## 06AP01-4

### Influence of magnesium on local cerebral microcirculation in patients with subarachnoid hemorrhage: preliminary data using an intraoperative laser-Doppler spectrophotometry system

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**Background and Goal of Study:** The intravenous application of magnesium sulfate during neurosurgical procedures can foster vasodilatation, which is a desirable mechanism in vasospasm therapy especially in patients with subarachnoid hemorrhage (SAH). **O**nly few reports deal with the impact of magnesium on local cerebral microcirculation in those patients. We present our preliminary results using a novel non-invasive, real-time measurement device during neurosurgical procedures.
**Materials and methods:** In this prospective, single-institution, non-randomized trial we studied local cerebral microcirculation using the non-invasive laser-Doppler spectrophotometry system “Oxygen-to-see(O2C)” in 10 consecutive patients with aneurysmatic SAH Hunt and Hess grade 2 to 5 with aneurysms of the anterior and middle cerebral arteries. After dura opening, a probe was placed onto the cortex next to the site of preparation. In 7 mm tissue depth, capillary venous oxygenation (SO2), post-capillary venous filling pressures (rHb), blood cell velocity (velo) and blood flow (flow) were measured. Data samples were collected during real-time monitoring over a period of 30 seconds each as a baseline value immediately prior to administration of 5 g magnesium sulfate 10% and 10 minutes afterwards. Magnesium sulfate was continuously administered with an infusion rate depending on blood pressure (>60 mmHg mean arterial blood pressure).
**Results and discussion:** We observed a higher median *flow* of 22% (4-70%) and *velo* of 9% (6-32%), no changes in *SO2*, and a decrease of *rHb* of 7% (5-30%) compared to the baseline measurements. This indicates an increased cerebral blood flow on the microcirculatory level. Anaesthesiological parameters remained stable with temperature corrected partial carbon dioxide pressure 37.8±3.6 mmHg, hemoglobin 11.6±1.6 g/dl, hydrogencarbonate 24±1.1 mmol/l, positive endexpiratory pressure 1 to 3 mBar, systolic/diastolic blood pressure 102±13.3 mmHg and 55±8.9 mmHg, mean arterial blood pressure 72.5±10.1 mmHg, heart rate 56±10.3 bpm, endexpiratory CO2 31±2.4%, inspiratory O2 of 45±7.8%, and a bladder temperature of 35.8±0.6°C.
**Conclusion:** Data indicate that local cerebral microcirculation is increased after intravenous application of magnesium sulfate in patients with aneurysmatic subarachnoid hemorrhage. Continous real-time monitoring of brain perfusion parameters may be instrumental in preventing vasospasm by defining the optimal administration of magnesium sulfate.

## 06AP01-5

### Postoperative cognitive changes in the elderly

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**Background:** Elderly Patients routinely undergo complex surgical procedures. At times, a deterioration in memory and concentration may persist for weeks or months. Postoperative Cognitive Dysfunction (POCD) is recognized as a complication after surgery in the elderly. An intermediate state between normal aging and dementia known as mild cognitive impairment (MCI) has been recognized. Individuals with MCI have an increased risk of progression to dementia compared to nonimpaired
(NI) elderly. We sought to determine whether patients with MCI would have accelerated progression of dementia postoperatively when compared to a NI group.
**Methods:** 36 patients aged 65 and older undergoing major surgery under general anesthesia were recruited after IRB approval. MCI status was determined by administration of the Global Deterioration Scale.11 subjects were determined to have MCI preoperatively and 25 were in the NI group. All subjects had neurocognitive tests preoperatively and at 6 months post surgery. Tests included the Guild Memory, Auditory Verbal Learning (AVLT), Digit Span and Trail Making Tests. Differences between baseline and 6 month for the MCI and NI groups were evaluated with paired t
tests. Cross sectional differences between the MCI and NI group at both time points were evaluated with t tests. Statistical significance was defined as $p<.05$ and a trend was defined as $p<.10$.
**Results:** Paired t tests of NI from baseline to 6 months demonstrated a significant increase in performance on NYU Guild Memory Test, Immediate recall and AVLT Delayed Trial. There was a trend toward improvement on Trail Making Test B and AVLT Trial 1. Paired t tests of MCI from baseline to 6 months demonstrated a significant increase on TMT, Part A and a trend toward improvement on AVLT, Trial 1. Significant difference between the MCI and NI group at baseline on TMT, Part A and trend toward a difference on AVLT, Trial 8.
**Conclusion(s):** This study suggests that there is an association between particular cognitive domains and postoperative status. Individuals with MCI improved on fewer domains compared to NI. NI group improved on delayed memory postoperatively whereas those in the MCI group did not. MCI individuals performed significantly worse than NI on delayed memory and motor processing speed at baseline. Post surgical improvement on cognitive domains related to auditory attention and motor speed may implicate psychological and physical factors that may depress cognitive functioning.

## 06AP01-6

### Changes in brain oxygenation and neuropsychological functioning after elective electrical cardioversion of atrial fibrillation

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**Background and Goal of Study:** Successful electrical cardioversion (ECV) of atrial fibrillation (AF) is reported to increase regional cerebral tissue oxygenation (rSO2) while unsuccessful ECV does not (1).
First, we aimed to confirm these preliminary results and to evaluate whether this increase in rSO2 was long-lasting.
Second, we applied a battery of neuropsychological tests before ECV and at 4-6 weeks follow-up in order to correlate changes in brain oxygenation to patient's neuropsychological functioning.
**Materials and methods:** With IRB approval, a prospective observational study was performed in 60 consecutive AF patients scheduled for ECV. rSO2 was continuously measured prior to induction with propofol and during ECV with Near Infrared Spectroscopy (Equanox Nonin® technology), and ended 15min after return of consciousness. A second measurement period (5min) took place at 4-6 weeks after ECV. To assess neuropsychological functioning, patients performed standardized neuropsychological tests (auditory verbal learning test, trail making tests (part A -B), digit-symbol coding test) together with mini-mental state examination and SF-36 questionnaire. Results were significant if $p<0.05$.
**Results and discussion:** In 50 AF patients ECV was successful, while in 10 patients sinus rhythm was not obtained. There were no significant differences between the groups in baseline rSO2 (70% ± 6 vs. 69% ± 5; p=0.87). rSO2 increased signficantly after successful ECV (prior to ECV: 70% ± 6 vs. after ECV: 71% ± 6; p=0.03). After unsuccesful ECV, rSO2 was comparable to baseline values (69% ± 5 vs. 68% ± 4; p=0.48). At follow-up, rSO2 was no longer increased compared to baseline. (70% ± 6 vs. 68% ± 4.8; p=0.08). However, after unsuccessful ECV, rSO2 was significantly lower than at baseline (69% ± 5 vs. 63% ± 8; p=0.04). The mental health and vitality of AF patients with a successful ECV improved significantly, while after unsuccessful ECV both decreased significantly ($p<0.05$).
**Conclusion(s):** The observed increase in rSO2 after successful ECV confirms previous findings. However, our results demonstrate that this increase in cerebral oxygenation is not long-lasting. Nonetheless, quality of life did improve after succesful ECV, while patients with unsucessful ECV experienced worse neuropsychological functioning, accompanied by a decreased brain oxygenation.
**References:**
1. Wutzler A et al (2014) Europace;16:189-194

## 06AP01-7

### Isoflurane impairs motor function recovery by increasing neuroapoptosis and degeneration during spinal ischemia-reperfusion injury

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**Background and Goal of Study:** Spinal cord ischemia (SCI) is one of the major concerns of postoperative paraplegia following major vascular or aortic surgery with the incidence of 1.5% for coarctation repair and up to 20% for thoracoabdominal aorta repair. The effect of intraoperative neuroprotection against SCI and the subsequent ischemia reperfusion injury is still limited. Since isoflurane is a commonly used anaesthetic agent during major operation, and its neuroprotective and neurotoxicity effects have both been discussed, this study aimed to investigate the effect of isoflurane on the spinal cord's functional recovery in a rat model of cord ischemia.
**Materials and methods:** Rats were randomly anesthetized by parenteral anaesthetic (Zoletil®) and isoflurane (0 and 1.5 % v/v in oxygen). Cord ischemia was induced by cross-clamping of thoracic aorta at the level of T5, and cord perfusion was resumed after 25 min. The motor function was assessed independently up to 48 h after reperfusion. Spinal cords were harvested and analyzed for molecular and histological changes.
**Results and discussion:** The locomotor rating scale was significantly reduced in rats that received isoflurane treatment during SCI at 12 to 48 h after reperfusion. Isoflurane suppressed the expression of iNOS and tissue levels of IL-6. However, the protein expressions of glial fibrillary acidic protein (GFAP), cleaved caspase-3 and Iba-1 were enhanced in the injured spinal cord. Increased apoptotic cells and presence of axonal damage were also observed in the histological sections.
**Conclusion(s):** Our results demonstrate that administration of inhaled isoflurane in spinal cord ischemia reperfusion injury deteriorates the recovery of motor function. The neurotoxicity response is independent from iNOS and inflammatory reaction, but is associated with neuronal apoptosis and degeneration. This study highlights the potential adverse effect of isoflurane on the functional recovery of ischemic spinal cord during major aortic surgery.

## 06AP01-8

### Neuromarkers for in-hospital mortality prediction. Are they valuable?

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**Background and Goal of Study:** Traumatic brain injury (TBI) is serious and often lethal condition so predicting its outcomes can be really beneficial. Investigation of neuromarkers is simple but not widely used method. The aim of this study was to compare S100B and NSE values for in-hospital mortality prediction after TBI.
**Materials and methods:** A prospective study took place in Anesthesiology clinic of Lithuanian University of Health Sciences Kaunas Clinics. Serum of 46 patients with severe TBI was investigated for neuromarkers S100B and NSE at hospital admission and 24, 48 and 72 hours after the admission. Outcomes were assessed and compared to specific values using nonparametric statistical tests. All 4 measurements were obligatory for inclusion to the study. Level of $p\leq0.05$ was assumed as statistically significant. Approval of Regional bioethics committee was obtained before study initiation.
**Results:** 46 patients were involved in the study. The average age was 55.33±16.8 years and there was no significant difference between women and men, however the number of men were higher than women, 35 and 11 respectively. The median of each test was used to evaluate if the specific value had an impact on in-hospital mortality. The medians of S100B were 14.98 pg/ml [7.21; 67.66], 12.69 pg/ml [7.21; 66.88], 10.3 pg/ml [7.21; 40.77] and 9.7 pg/ml [0.9; 12.69] at hospital admission, after 24, 48 and 72 hours respectively. Only 12.69 pg/ml and 10.3 pg/ml differed significantly but had no impact on increasing the risk of in-hospital mortality. The medians of NSE were 9.72 μg/l [3.93; 21.54], 7.56 μg/l [3.99; 14.65], 6.24 μg/l [3.15; 17.23], 5.65 μg/l [3.08; 15.87] at hospital admission, after 24, 48 and 72 hours respectively. The values of 7.56 μg/l and 6.24 μg/l had a significant difference and increased the risk of in-hospital mortality 4.0 and 9.35 times respectively. The measurement of both neuromarkers at hospital admission and after 72 hours had no significant difference while the second and the third measurements of both markers were statistically significant.
**Conclusion:** Both S100B and NSE can be predictors of in-hospital mortality for patients with severe TBI. However, the time of neuromarkers investigation is important as only after 24 and 48 hours the statistical significance was found. Moreover, it can be assumed that NSE is slightly more valuable than S100B for in-hospital mortality prediction in severe traumatic brain injury.

## 06AP01-9

### Role of dexmedetomidine for sedation in neurocritical care patients: a systematic review

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**Background and Goal of Study:** Stable hemodynamics is considered as the cornerstone of optimum perioperative management in neurocritical care (NCC) setting and may be challenging, especially in the subset of patients with

acute brain injuries. Dexmedetomidine (DEX), a highly selective α2-agonist, with sedative, sympatholytic, and anti-nociceptive properties has shown a favourable profile when used as sedative agent in different clinical settings. Aim of this systematic review is to appraise the clinical evidence on efficacy and safety of DEX, as a sole sedative or as sedative adjunct in adult NCC patients.
**Materials and methods:** A search from PubMED, EMBASE and Cochrane Central Register was conducted to identify randomized clinical trials (RCTs) and observational studies reporting the use of DEX alone or as adjunct for sedation in neurosurgical and NCC setting. The primary outcome measure was the occurrence of hemodynamic changes, while the secondary ones were sedative and analgesic efficacy and perioperative outcome defined as quality and time to awakening and development of adverse events.
**Results and discussion:** A total of 5748 records were retrieved from database search and 1105 were screened after filtering. Out of these, 1097 were excluded as not-relevant, non-full-text or duplicate. Finally, 8 trials including 3 RCTs and 5 observational studies, enrolling 650 patients, were selected. All the retrieved studies had a high risk of bias and a low to moderate quality. Sedative and analgesic efficacy of DEX was assessed by 3 studies and showed that the use of DEX provided a better sedation score and reduced analgesic requirements when compared to propofol or midazolam sedation. Hemodynamic effects of DEX defined as bradycardia and blood pressure changes were assessed by 5 and 6 studies, respectively. No clinically significant differences in hemodynamic conditions (hypotension or bradycardia) between DEX and control groups, were identified. Adverse events were not consistently reported.
**Conclusion(s):** Available clinical literature supporting the efficacy and safety of DEX use in adult NCC setting is of limited quantity and quality. However, from the current evidence on the use of DEX in NCC, as sole sedative agent or as an adjunct, seems that DEX use in this setting is both efficient (qualitative sedation and analgesic sparing effect) and safe (no significant hemodynamic effects and adverse events).

## 06AP01-10

### External ventricular derivation vs lumbar puncture cerebral spinal fluid analysis for diagnosis of meningitis in neurosurgical patients

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**Background and Goal of the Study:** Meningitis in neurosurgical patients is serious postoperative complication that needs early recognition and treatment. Diagnosis might be difficult because of overlapping clinical presentation caused by surgery or trauma. Standard CSF studies are unreliable because of blood caused by subarachnoid haemorrhage (SAH) or surgery. The aim of this retrospective study is to evaluate and compare the diagnostic usefulness of cerebrospinal fluid (CSF) obtained from external ventricular derivation (EVD) and lumbar puncture (LP) for detection of postoperative bacterial meningitis.
**Materials and methods:** Retrospective observational study from January 2015 to November 2015 included 48 patients after elective or emergency neurosurgical procedures due to brain tumors, aneurysmal clipping or brain trauma. CSF was obtained by EVD and/or LP, and analysed for cellularity, protein, neutrophils, glucose, lactate, C reactive protein (CRP) and microbiology culture. Blood analysis was done too: leucocytes, glucose, lactate, CRP and blood culture.
**Results and discussion:** We enroled adults ≥18 years of age: 10 patients had EVD and LP, 12 patients only EVD, and 26 had LP. Eight patients had positive CSF culture: 2 Staphylococcus hominis, 3 Micrococcus luteus, 1 Pneumococcus, 1 Staphylococcus epidermidis and 1 Staphylococcus haemolyticus. CSF culture from EVD was positive only in one patient. Seven patients had positive CSF culture obtained by lumbar puncture. Comparing CSF from EVD and LP we found significant differences only between glucose, table 1. Comparing positive and negative lumbar CSF we found significant differences between lactate (7.37 vs 4.17 mmol/L, p=0.015), proteins (5.95 vs 2.53 g/L, p=0.048) and CRP (12.04 vs 2.52 mg/L, p=0.0027), but not glucose (2.59 vs 3.13 mmol/L, p=0.34) and cellularity (4939/3 x$10^6$/L vs 2885/3 x$10^6$/L, P=0.54). The p value <0.05 was considered significant.

| CSF parameters | CSF-EVD (mean) | CSF-LP (mean) | p value |
|---|---|---|---|
| erythrocytes | 718729 | 225193 | 0.15 |
| cellilarity/3 x$10^{6/L}$ | 2323.5 | 3009.7 | 0.52 |
| glucose (mmol/L) | 3.91 | 3.11 | 0.0015 |
| lactate (mmol/L) | 4.8 | 4.4 | 0.429 |
| proteins (g/L) | 3.0 | 2.5 | 0.546 |
| CRP (mg/L) | 4.3 | 2.8 | 0.188 |

*[Table 1. CSF parameters from EVD and LP]*

**Conclusion(s):** CSF samples obtained from LP are superior than EVD samples for diagnosis of postneurosurgical meningitis.

## 06AP01-11

### Stellate ganglion block promotes recovery of idiopathic sudden sensorineural hearing loss

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**Background and Goal of Study:** Sudden sensorineural hearing loss (SSNHL) is an acutely developing sensorineural hearing loss of unknown causes, but resumed causes include viral infection, allergy, internal ear circulatory disturbance, and endolymphatic edema. Treatment of SSNHL include combination therapy with systemic steroids, vitamin B 12 and prostaglandin E1 so far. Stellate ganglion block (SGB), a selective sympathetic block for ipsilateral head and upper extremities is used for the treatment of patients with vascular insufficiency and pain syndromes of the face, and upper extremities. SGB may improve impairments in microcirculation of the inner ear involved in the pathophysiology of SSNHL. It is not clear that SGB can have a beneficial effect to treat ISSNHL.[1]
Therefore, in this study we evaluated the effect of combination with SGB and conservative therapy (steroid, vitamin B 12, and prostaglandin E1 on SSNHL, compared with conservative therapy alone.
**Materials and methods:** We retrospectively reviwed 135 patients diagnosed with ISSHL, were treated with conservative treatment alone (Non-SGB, n=60) or conservative therapy with SGB (SGB, n=75). All patients were provided systemic steroids, vitamin B 12 and prostaglandin E1. For SGB group, ultrasound-guided SGB was performed twice per week using 6 ml of 1% lidocaine for a total 2 weeks. Auditory evaluations were performed by pure tone audiometry (PTA) before and 1 month after treatment.
**Results and discussion:** There is no difference in the demographic data. There is no difference in the value of Initial PTA and the degree of hearing loss of the initial PTA in two groups.The SGB group had statistically greater hearing gain, compared with the Non-SGB group
(30.9 dB versus 23.8 dB, P <0.001). There are more patient with recovery rate >80% in the SGB group than in the Non-SGB group (21% versus 3%, P <0.001).
**Conclusion(s):** This study suggests that combination of SGB and conservative treatment has a positive influence on recovery of ISSHL ,compared with conservative treatment alone.
**Reference:**
1.Takinami Y. Evaluation of effectiveness of stellate ganglion block (SGB) treatment of sudden hearing loss. Acta Otolaryngol. 2012; 132:33-8.

## 06AP02-1

### Influence of patient positioning on hemodynamic and cerebral repercussions of induction of general anesthesia with propofol

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**Background and Goal of Study:** Anesthesia induction with propofol causes a 17% to 27% reduction in blood pressure(BP) and cardiac output(CO) and may adversely affect outcome[1-3]. Performing induction with the patient in an head-elevated position, followed, after loss of consciousness (LOC), by 20º Trendelenburg, might attenuate the fall in BP caused by propofol: increased venous return caused by switching from head-elevated to Trendelenburg would increase CO and attenuate the BP fall.
**Methods:** Elective patients, ASA I to III, were randomized to anesthesia induction in the normal horizontal supine position (SUP) or head-elevated (H-E) (45º) position, followed by slight Trendelenburg position (20º) right after LOC and before intubation. In both groups anesthesia was induced with propofol 1% at 3,3 ml/kg/h. LOC was assessed by lack of eye opening to name calling and a tap on the forehead. At the moment of LOC the predicted Ce (Schnider's Pk) was noted and the pump was switched to TCI Rocuronium was given. Non-invasive BP was monitored "continuously". BIS was monitored. Data are mean±SD. Statistics used Student's t-Test. IRB and informed signed consent were obtained.
**Results:** The results from 24 patients are presented: 11 received propofol in the supine position and 13 in the head-elevated position. Age was 50±16 vs 52±17, weight was 70±17 vs 81±16 and height was 167±11 vs 171±6. Mean arterial pressure fell by 14±10% in the supine group vs 25,3±12% in the head-elevated (P=0,02). Heart rate increased by 25±17% in the supine vs 14±16% (P=0,13). Minimum BIS following induction was 38±7 vs 36±8. Average BIS between one minute after LOC and the end of the study was 51±7 vs 46±9 (P=0,2). Propofol predicted effect site concentration at the moment of LOC was 5,1±1,1ug/ml in the supine vs 6,1±1,3ug/ml in the head elevated (P=0,07). Propofol Ce resulting from the reduction applied by the use of the formula was 3,4±0,4ug/ml in the supine vs 3,7±0,4ug/ml in the head-elevated (P=0,049). Percent reduction in Propofol Ce from LOC was 32±7% vs 37±7% (P=0,12).
**Conclusions:** Propofol induction in the head-elevated position caused a higher fall in blood pressure, so our initial theory was wrong. Inducing anesthesia in the horizontal position is better. Induction in the semi-seated seems to require more propofol; this could explain the increased fall in blood pressure.
**References:**
1. Anesth Analg1989;69:35-40
2. Anesth Analg2005;101:622
3. Anesthesiology1994; 81:1384.

## 06AP02-2

### Effects of dexmedetomidine during supratentorial craniotomy with intraoperative neuromonitoring

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**Background:** Dexmedetomidine (Dex) has been shown to be an useful agent as an adjunct to an opioid-propofol total intravenous anestesia (TIVA)[1]. Intraoperative neurophysiological monitoring (IOM) is used in supratentorial surgery involving eloquent areas of the brain to allow the maxim extent of resection, minimizing the risk of postoperative neurological deficits. We compared propofol and remifentanil consumption, and the effects of TIVA and TIVA with Dex on transcranial motor and somatosensory evoked potentials (MEPs and SSEPs).
**Methods:** After approval by the Ethical Committee, fourteen patients scheduled for supratentorial craniotomy with IOM entered the study. The first 30 minutes of anaesthesia all patients received TIVA. Afterwards they were randomized in two groups to receive:
Propofol plus remifentanil and physiological saline infusion (PR, n=7) or Propofol plus remifentanil and Dex infusion (0.5 $mg \cdot kg^{-1} \cdot h^{-1}$) (PRD, n=7), to maintain a Bispectral Index between 45 and 60.
Propofol and remifentanil requirements at 30 (baseline) and 45 minutes were evaluated. The threshold intensity, the latency and the amplitude of MEPs and SSEPs were recorded at 30 minutes and 45 minutes.
**Results:** Propofol requirements were lower in PRD group, but without significant differences between groups (p 0.08). Acid lactic was lower in PRD group, with no statistically significant differences
(p 0,016).
MEPs and SSEPs were elicited safely in all patients. There were no statistically significant differences in threshold intensity, latencies and amplitudes between groups. Postoperative morphine requirements were similar in both groups.
**Discussion:**
We observed a tendency to lower value of propofol in PRD group. Dex does not seem to alter MEPs and SSEPs for IOM in supratentorial surgery[3]. The lactic acid was significantly lower in PRD group. More patients are necessary to confirm these results.
**References:**
1. Tanskanen PE, Kytta JV, Randell TT, Aantaa RE. Dexmedetomidine as an anaesthetic adjuvant in patients undergoing intracranial tumour surgery: a double-blind, randomized and placebo-controlled study. British Journal of Anaesthesia 2006;97(5):658-65.
2. Rozet I, Metzner J, Brown M, Treggiari MM, Slimp JC, Kinney G, Sharma D, Lee LA, Vavilala MS. Dexmedetomidine does not affect evoked potentials during spine surgery. Anesthesia Analgesia 2015;121(2):492-501.
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## 06AP02-4

### Macroglossia post craniotomy in semi-sitting position, a case report and review of literature

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**Background:** 37 year old female patient underwent craniotomy for subthalamic brain tumor in sitting position lasted 10 hours,post extubation developed macroglossia with difficult intubation ended with surgical tracheostomy, complicated with sepsis and died 16 days post operatively.We reviewed 26 similar cases.
**Case report:** A 37 year-old single female patient, known case of suprasellar brain tumor (low-grade glioma with pilocytic features).The surgical procedure lasted for around 10 hours and was performed in the sitting position with the head is flexed in position and throat pack was inserted.
Invasive monitoring was initiated.Anesthesia was induced with propofol and fentanyl and maintained with isoflurane,and muscle relaxation with cisatracurium,her airways were secured with an endotracheal tube and the patient was connected to a mechanical ventilator.Surgery was finished, she was given reverse of muscle relaxant, throat pack was removed, spontaneously breathing of Vt 800-850ml with respiratory rate 10-12 breath per minute,and stable vital signs.In supine position, extubation was done. Neurological-exam had showed left sided weakness at the bedside with macroglosssia was noticed,her O2 saturation kept at 93-94% by face mask ventilation.We asked surgery team for urgent tracheostomy.While keeping bag-mask ventilation. Nine days later her creatinine level was back to normal and her tongue size get more increased in size.Sixteen days later,she developed asystole.
**Discussion:** MACROGLOSSIA is infrequent but potentially lethal postoperative complication following intracranial neurosurgical procedures in the posterior fossa.[1-11] The incidence of this complication has been estimated to be 1%[9]; however,the complication may be underreported, and its actual incidence is unknown.The etiology of macro- glossia is uncertain, and has been attributed to arterial compression, venous compression, mechanical com-pression, or to neurogenic origin. [6,9]
The etiology of macroglossia may be multifactorial.
**Reference:**
McAllisterAnesthesiology1974
**Learning points:** Facial and neck swelling is an unusual surgical complication and the exact etiology is still unclear. Before extubation following a long duration surgery, it is essential to evaluate if there has swelling of oropharynx and tongue as well as evidence of airway obstruction. Even if intraoperative jugular venous compression is the initial event, it does not explain the existence of the same phenomenon in the postoperative period 12.

## 06AP02-5

### A comparison of $N_2O/O_2$ versus $Air/O_2$ gas mixtures in total intravenous anesthesia during elective endovascular coil embolization

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**Background and Goal of Study:** Since Guglielmi detachable coil embolization has been introduced as a potential alternative treatment for intracranial aneurysms (IA), endovascular technology is one of well established methods for treating IA. This procedure is usually performed under general anesthesia. Some authorities suggest that $N_2O$ is not suitable for this procedure because it increase the risk of air embolism.[1] The aim of our study was to investigate whether the use of $N_2O$ can increase risk of air embolism during coil embolization for IA, compared with $Air/O_2$ gas mixtures in total intravenous anesthesia.
**Materials and methods:** With the approval of IRB, 95 patients for elective endovascular coil embolization were enrolled and randomly allocated into two group; $N_2O$ group ($N_2O/O_2$; 50:50, n=49) or AIR group ($Air/O_2$ gas mixtures, n=46). MRI for diffusion-weighted imaging (DWI) was performed 24 hours after embolization and the number of lesions was evaluated by two study blinded radiologists. Additionally, Modified Rankin Scale (mRS)[2] and complications were compared.
**Results and discussion:** There is no difference in demographics and anesthetic time between groups. The DWI analysis showes no difference in the number of embolic lesions between groups. The mRS scores after procedure are lower than those before procedure in both groups ($p < 0.05$), but have no difference between groups. The complications after treatment show no difference between groups.

| | $N_2O$ group (n=49) | Air group (n=46) |
|---|---|---|
| The numbers of embolic lesions in MRI with DWI | 5.6 ± 5.7 | 3.96 ± 3.4 |

*[The numbers of newly appeared embolic lesions]*

| | mRS before coiling | | | mRS at discharge | | | p-value |
|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 0 | 1 | 2 | |
| $N_2O$ group | 18 | 26 | 5 | 32 | 13 | 4 | 0.019* |
| Air group | 19 | 23 | 4 | 34 | 11 | 1 | 0.006* |
| p-value | | 0.636 | | | 0.298 | | |

*[The comparisons of Modified Rankin Scale (mRS)]*

**Conclusion(s):** Nitrous oxide/oxygen gas mixtures with intravenous anesthesia dose not increase risk of air embolism during intracranial coil embolization.
**References:**
1. Curr Opin Anaesthesiol. 2010 23(5):544-50.
2. Baggio JA, et al.Cerebrovasc Dis. 2014;38(4):297-301.
3. Varma MK, et al. Br J Anaesth 2007; 99(1): 75-85

## 06AP02-6

### Evidence based management of aneurysmal subarachnoid haemorrhage an audit of current practice

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**Background and Goal of Study:** Sub arachnoid haemorrhage (SAH) accounts for 5% of all stroke.
Despite advances in diagnosis and treatment, overall mortality is around 50%. One-third of survivors are dependent for care and almost half will have cognitive impairment sufficient to affect their quality of life.
A multidisciplinary team is involved in patient care and Anaesthetists are involved from the initial stabilization and diagnosis through to providing anaesthesia for definitive treatment and post operative support in critical care.
**Materials and methods:** We conducted a retrospective audit of paper and electronic records looking at 21 patients who underwent coiling for SAH. The data was collected against the guidelines produced by AHA/ASA 2012 directed towards prevention and treatment of re-bleeding, vasospasm, delayed cerebral ischaemia, hydrocephalus and seizures, to assess current practice at University Hospital North Midlands, UK.
**Results and discussion:** 21 patients (19 females and 2 male), age range 25 to 67 years old, mean 54.5 +/- 11.3. One third of aneurysms were multiple and two thirds were single. 15 aneurysms were less than 7mm in size.
52% of patients were transferred from another hospital.
75% patients were treated within 24hrs
90% of patients treated within 48 hours. Mean time to treatment was 19 hours.
100% had nimodipine prescribed and 100% received nimodipine
38% of patients missed between 2 and 4 doses of nimodipine
33% of patients received 1st nimodipine dose in hospital >4 hours post admission
1/21 patients received tranexamic acid.
50% of patients had a 0 or 1 Modified ranking Scale score at 6 months follow up.
Retrospective collection of data is flawed, but future audit will be improved following introduction of prospectively compiled database.
Pre-operatively patients were managed appropriately as evidenced from good outcomes at 6 months. Improvements could be made in administration of prescribed drugs, in particularly nimodipine for which there is strong evidence for prevention of vasospasm.
Optimal fluid balance and closer blood pressure control can also be improved to avoid secondary brain injury.
**Conclusion(s):** Good practice was observed at UHNM complying with the recommendations of the AHA/ASA for definitive treatment of aneurysm within 72hrs.
We are introducing a check-list style proforma with key interventions to be signed and dated in front of patient notes to improve and standardise care.

## 06AP02-7

### Density spectral array of BIS VISTA monitoring system in epilepsy surgery with intraoperative electrocorticography

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**Background:** The Bilateral Bispectral Index (BIS) was designed to allow the user to record and display four channels of EEG; two from each side of the brain. This monitor equally shows changes in the power spectrum distribution through the Density Spectral Array (DSA). Asymmetry (ASYM) is a processed variable indicating the percentage of EEG power present in left or right hemispheres with respect to total (left and right) EEG power2.
In our case BIS was used to observe changes in DSA, during the anesthetic-surgical procedure.
**Case report:** A 51-years-old man underwent left amigdalohipocampectomy 3 years ago for drug resistant epilepsy. However, he continued with epileptic crisis and he was scheduled for left temporal lobectomy with intraoperative electrocorticography (ECoG). On entering the operating room, the electrocardiogram, non invasive blood pressure and the percentage oxygen saturation were monitored. Bilateral BIS electrode strip was placed on the front temporal position according to the International 10-20 system of electrode placement. Anaesthesia was maintained with sevoflurane, remifentanyl and dexmedetomidine to keep BIS values within 45-60 range.
During surgery, an asymmetry was detected related to the left hemisphere, where the epileptogenic focus was. This asymmetry was a consequence of a power increase in low frequency (0.1- 4 Hz) and alpha bands (8-12 Hz). Before performing the intraoperative ECoG, sevoflurane and remifentanyl infusion rates were slowed resulting in light anesthesia, which caused a decrease of power in low frequency and alpha bands, more visible in the right side. When the surgery finished, sevoflurane was increased and the effect of "fill-in" of sevoflurane on the spectrogram appeared, increasing the power on the left hemisphere. Unlike DSA, the BIS trend did not reflect differences between two hemispheres.
The patient was extubated in the operating room and transferred to the recovery room and discharged from hospital two days later.
**Discussion:** This case provides novel evidence to support the clinical utility of DSA in monitoring depth of anaesthesia and sedation. As described by Purdon, every anesthetic has its own spectrogram.

**References:**
Hernández-Hernández MA, et al.Med Intensiva.2014,May;38(4):265-7.
Purdon P et al. Anesthesiology,2015,October;123(4):1-24.
**Learning points:** DSA monitoring provides additional information about BIS allowing us to see how anaesthetic drugs affect spectrogram differently.

## 06AP02-8

### Intraoperative monitoring of tissue pressure oxygen (PtiO2): report of a case

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**Background:** The advantages of intraoperative monitoring of tissue oxygen pressure (PtiO2) for vascular neurosurgical procedure is to be reliable and immediate in obtaining information on the state of tissue oxygenation as a marker of ischemia exposed vascular territory.
**Case report:** 75 year old woman with hypertension, with incidental finding aneurysm right middle cerebral artery, M1. Following 4 years, with impossibility of interventional radiology treatment because of their location (Figure 1). It is scheduled for surgery under general anesthesia.
Before the transitional clipping there was a gradual decline in PtiO2, which coincided with a significant decrease in the amplitude of the left middle PEM Nv, and decrease in SBP and HR. After administration of 2 boluses of ephedrine 10 mg, she presented hemodynamic recovery potential and PtiO2.
During the phase of temporal clamping PtiO2 no alterations in, or potential became evident.
The patient remained stable throughout the procedure.
After surgery, the patient was admitted to the reanimation unit for 24 hours, extubándose in the early hours without showing neurological focus.
**Discussion:** The monitoring intraopertaria PtiO2 in the territories at risk of ischemia is very sensitive, providing real-time information, as we observed in our case, with decreased PtiO2 and the drop in potential, which recovered spontaneously improve hemodynamically.
**References:**
1. Gelabert-González, M., Fernandez-Villa, JM, Ginesta-Galan, V .: Intraoperative monitoring of brain tissue O2 (PtiO2) During aneurysm surgery. Neurochir Act (Wien) 2002; 144: 863-866.
2. Massabuau JC. From low arterial-to-low tissue oxygenation strategy. An evolutionary theory. Respir Physiol. 2001; 128: 249-61.
**Learning points:** There is little use of this and other invasive monitoring methods intraopertaoria in vascular neurosurgery, despite not lead to additional trauma to the intervention itself; on the contrary, the PtiO2 is accurate and provides real-time data that go beyond suggestive impressions neurosurgeon time-based temporary occlusion.

## 06AP02-9

### Monitoring depth of anesthesia: trends in a Portuguese hospital

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**Background and Goal of Study:** Assessing the adequacy of the depth of anesthesia is very important in preventing intraoperative awareness. On the other hand, a tailored approach to each patient can reduce the amount of anesthetic given, decrease the time to eye opening and extubation and shortening the duration of postanaesthesia care unit stay (1). There are many monitors available for processing electroencephalography (EEG), and bispectral index (BIS) is reported as the most used (2). However, the percentage of intraoperative monitoring of depth of anesthesia and BIS usage in our clinical practice it is not well described.
**Materials and methods:** The study had IRB approval and the consent from individual anesthesiologists. During 6 weeks on weekdays, 11 operating rooms for neurosurgery, orthopedics and general surgery were visited twice daily at 1 and 6 PM for data gathering. In ORs where a case was going on, if the anesthesiologist in charge accepted, he/she would fill an 11-questions form.
**Results and discussion:** A total of 304 of cases of general anesthesia were assessed. Monitors for the depth of anesthesia were employed in 84% of these cases, and BIS was the most used (98%). When depth of anesthesia was not being monitored, in 31% of the cases the equipment was not available, 21% considered the procedure too short, 5% failed to remember, 5% considered its use unnecessary and 36% appointed no specific reason.
The highest percentage of BIS use was in the Neurosurgical operating rooms (92,5%) in contrast to Orthopaedics (58,2%). The anaesthetist experience did not influence the use of depth of anesthesia monitoring (p>0,05).
**Conclusion(s):** DOA monitoring at our institution is very frequent (84% of cases), but a wide variation was observed among different surgical specialties regarding the its usage in general anesthesia cases. Interestingly the highest rate was in neurosurgery, where DOA monitoring is less consensual and less practical. This suggests that awareness about the well being of the brain among neuroanesthesiologists may be the determinant factor. Experience of the anesthesiologist was not a factor.
Monitoring the depth of anesthesia is widely used, and BIS is the most widespread monitor. The experience of the anaesthetist does not influence its use, but in some surgical specialities they are more prone to be employed.
**References:**
1. Cochrane Database Syst Rev. 2014 Jun 17;6:CD003843.
2. N Engl J Med. 2008 Mar 13;358(11):1189-91

## 06AP02-10

### Use of antihypoxant drugs on severe TBI with EEG monitoring

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**Background:** The fastest alternative way of correcting tissue hypoxia is succinate oxidase oxidation, which is achieved through the increased activity of succinate dehydrogenase and improve the penetration of exogenous succinate in the mitochondria of cells. For the treatment of cerebral hypoxia has been applied antihypoxic combination therapy: succinic acid, riboxinum, vitamin B2, vitamin PP.The drug has a positive effect on the energy production in the cell and restoring the activity of antioxidant enzymes, reducing the release of neurotransmitters in the ischemia.
**Goal of Study:** Study of the efficacy of cytoflavin used during hospital stay in patients with severe TBI neuroprotection by correcting hypoxia and energy homeostasis.
**Materials and methods:** 60 patients with a diagnosis of severe TBI. Open prospective study on the type of “casecontrol”. Inclusion criteria: patients with severe TBI; GCS from 4 to 8 points. Group 1 consisted of 30 patients treated with the standard protocol. Group 2 30 patients who received, in addition to treatment protocol, cytoflavin (succinic acid, riboxinum, vitamin B2, vitamin PP), which was used at a dose of 5ml per day i.v. for 7 days. Patients were examined neurological (lobular and dislocation symptoms, GCS); EEG topographic mapping; variation pulsometry; CT brain.
**Results and discussion:** Response to the reaction of the CNS prevailed cytoflavin related to “hyporesponsiveness” reaction CNS in 35.7% of cases which is characterized by a moderate increase in capacity by β2- δ- reduction rate reflects the increase in the upper frequency limit and extending the effective frequency band of EEG pattern. In patients cytoflavin 2 group rate cumulative effects of neurohormonal factors on heart rate decreased ($p \leq 0.05$, TW, MCC) and amounted to 5928.07 MC2 (7-10 hours). Similarly reduced rate VLF - 27,3%. The ratio LF / HF increased respectively ($p \leq 0.05$, TW, MCC) and amounted to 2.94 due to the increase of LF and reduce HF.
**Conclusion(s):** The use of these drugs in TBI increase tissue oxygen consumption, stabilizes hemodynami, renders restorative effect and bruises of the brain contributes to the restoration of cognitive function, reduced the duration of the coma, time of stay in the ICU on 1.8 times. In calculating the risk ratio are found that in the third day significantly reduced the risk of death (RR) ± 95% CI = 3 (1,09-8,2) S = 0,52) in the 2nd group of patients where used cytoflavin.

## 06AP02-11

### Does dexmedetomidine influence somatosensory evoked potentials during spine surgery?

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**Background and Goal of Study:** Spinal cord injury and postoperative neurologic deficit is a potent complication following posterior spinal fusion. The most commonly used monitor of nerve function during spinal surgery is the somatosensory evoked potentials (SSEP). Intravenous anesthetic agents as far as inhaled agents produce a dose depended increase in latency and decrease in amplitude of SSEP Decreases in amplitude of 50% or more from the baseline associated with at least 10% prolongation in latency, is defined as clinically significant SSEP changes. As a result such changes should be immediately investigated. Dexmetedomidine-Dex is a highly selective $a_2$ adrenergic agonist, which is used as adjust in neuroanesthesia with intravenous or volatile agents. Dex not only minimizes the anesthetic agents but also the opioids, reducing the analgesic demands.
The current study aim is to evaluate the effect of Dex on SSEPS in adults during posterior spinal fusion surgery.
**Materials and methods:** Sixteen patients 18-75 years old, ASA I-III, scheduled for elective posterior spinal fusion surgery were enrolled in this prospective study. After induction in anesthesia, it was applied SSEP monitoring and a baseline test was performed after 15min (in order to wash out the propofol used for induction). Infusion of Dexmedetomidine was started at a bolus dose of 1mcg/Kg following by 0.7mcg/Kg. Bispectral Index (BIS) monitored the depth of anesthesia and an adequate level (40-50) of anesthesia was maintained by sevoflurane. SSEPs were recorded intraoperatively from the tibial nerve (P37) and data were analyzed over that period.
**Results and discussion:** MAC of sevoflurane was stable through all the procedure with minor fluctuations (0.3-0.4 MAC). The amplitude was decreased 49.8% from the baseline ($ampl_{bas}$:0.845±0.433$\mu$V, $ampl_{dex}$:0.424±0.193$\mu$V, p=0.001). Latency presented a small prolongation with no clinical or statistical significant ($latency_{bas}$: 45±9.27msec, $latency_{dex}$:46±6.61msec, p>0.05). All procedures were carried out without any surgical or anesthesiologic complications.
**Conclusion(s):** Dexmedetomidine induced severe suppression of the amplitude and a minor prolongation of the latency which however did not reach the criteria to be clinical significant. Dexmedetomidine seems to constitute a safe adjust to general anesthesia during SSEP monitoring performing.

## 06AP03-1

### Effect of skin infiltration with ropivacaine on postoperative pain in patients undergoing craniotomy under general anesthesia

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**Background:** Local anesthetic infiltration has been used to manage postoperative pain in various surgeries. The present study was aimed to investigate the effect of skin infiltration with 0.5% ropivacaine on postoperative pain in patients undergoing craniotomy.
**Methods:** One hundred and six patients with ASA I-II scheduled to undergo elective craniotomy were enrolled during March to November in 2015 in this prospective, randomized, placebo-controlled, double-blind study. After the anesthesia induction, skin around the incision was infiltrated with 0.5% ropicavaine (group R, n=53) and 0.9% saline solution (group C, n=53), respectively. Morphine was used as rescue analgesic postoperatively. Morphine consumption during the first 24 postoperative hours was recorded as the primary outcome, and the time to first rescue requirement was also recorded. Pain was assessed at 2, 4, 8, 24 hours, 7 days, 3 months after surgery by visual analog scale (VAS).Heart rate (HR) and mean arterial pressure(MAP) were recorded before anesthesia induction (T1), after anesthesia induction (T2), after scalp infiltration (T3), during skull drilling (T4), during mater cutting (T5) and skin closure (T6).
**Results:** Results are reported on 50 patients in group C, 51 in group R because of 5 patients were excluded from the study. Morphine consumption during the first 24 postoperative hours was significantly higher in group C than in group R (13.36[6.5, 20]mg *vs.* 6.3[0, 10]mg, $P<0.05$).
The first time of patients needed rescue analgesic was prolonged in group R as compared with group C (6.16[3.4, 8.0]h *vs.* 3.87[2.3, 4]h, $P<0.05$). Postoperative VAS and hemodynamic signs during the first 24 hours showed no significant difference in two groups. The incidence of persistent pain in 7 days and 3 months postoperatively had no significant differences between two groups.
Besides one patient (2%) enduring moderate pain (VAS: 4~7) in group C, the number of patients suffering from mild pain (VAS: 1~3) was 17(33.3%) in group R and 17(34%) in group C 3 months after surgery. The opioid consumption intraoperatively was not significantly different between two groups. HR and MAP in group C were higher than that in group R at the time points of T3 and T4.
**Conclusion:** The results suggest 0.5% ropivacaine scalp infiltration before skin incision has favorable analgesic effect in reducing morphine consumption and prolong the time of first rescue analgesic requirement after surgery.
**Acknowledgements:** for AstraZeneca's support

## 06AP03-2

### Comparison of the non-maximization and maximization fluid strategies for goal-directed therapy in supratentorial brain tumor resection craniotomies: a randomized controlled trial

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**Background and Goal of Study:** Intraoperative goal-directed therapy (GDT) improves patient outcomes. In GDT, clinicians often administer fluids to maximize cardiac output; however using this approach in brain surgery is controversial. It is because that cerebral blood flow may increase by fluid maximized cardiac output, even when blood pressure is within the autoregulation range but brain volume may be affected by excessive fluid infusion. In this study, we compared two fluid strategies of GDT, namely maximization and non-maximization, during craniotomy for supratentorial brain tumor resection.
**Materials and methods:** Eighty adult patients were enrolled and equally randomly divided into two groups according to targeted FloTrac-derived stroke volume variation (SVV): a low SVV group (maximization; supine SVV <10% or prone SVV <15%) and high SVV group (non-maximization; supine SVV <18% or prone SVV <23%). A colloid fluid challenge was administered to maintain SVV below the target threshold. Other treatment parameters, including a basal infusion of 0.9% saline, maintaining the cardiac index (CI) ≥ 2.4 L $min^{-1}$ $m^{-2}$, and mean arterial pressure (MAP) ≥ 65 mmHg or 15% change, were the same for each patient. Serum biomarkers of kidney injury (neutrophil gelatinase-associated lipocalin) and neuronal injury [neuron-specific enolase (NSE)] were measured at baseline, the end of surgery, and postoperative days 1 and 2.
**Results and discussion:** The two patient groups revealed comparable characteristics and intraoperative profiles (operation time, blood loss, transfusion, MAP, vasopressor usage, serum osmolality, urine output, and saline infusion volume). More infused colloids (888 ± 371 vs 606 ± 453 mL, p = 0.003), higher CI (3.1 ± 0.8 vs. 2.7 ± 0.6 L $min^{-1}$ $m^{-2}$, p = 0.012), and a trend of more favorable hospital outcomes (ICU stay: 1.6 ± 0.8 vs. 2.6 ± 3.3 days, p = 0.261; hospital stay: 1.6 ± 0.8 vs. 2.6 ± 3.3 days, p = 0.070) were observed in the low SVV group. The postoperative serum NSE level increased in the high SVV group but not in the low SVV group. Therefore, fluid maximization of the cardiac output during GDT may potentially be neuroprotective in patients receiving supratentorial brain tumor resection.
**Conclusion:** The non-maximization fluid approach of GDT during brain surgery is effective in maintaining adequate cardiac output without an increased risk of acute kidney injury; however, fluid maximization by using colloids may yield neuroprotective benefits.

## 06AP03-3

### The effect of regular intravenous acetaminophen on postoperative pain after supratentorial craniotomy

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**Background and Goal of Study:** Postcraniotomy pain should be well managed yet there is still no consensus on postoperative analgesia in intracranial surgery. It has been suggested that multimodal analgesia with intravenous (IV) acetaminophen (APAP) is effective for neurosurgical patients. The aim of this study is to determine the effects of regular IV APAP on postoperative pain intensity and the requirement of rescue pain medication in supratentorial craniotomy.
**Material and methods:** We evaluated anaesthetic charts and clinical records for supratentorial tumour removal between September 2014 and August 2015. Inclusion criteria was:
(1) patients not requiring mechanical ventilation after surgery;
(2) patients not requiring postoperative intensive care unit (ICU) care for over 24 hours;
(3) patients received IV APAP intraoperatively;
(4) patients received low-dose dexamethasone and droperidol as postoperative nausea/vomiting prophylaxes; and
(5) patients received scalp infiltration with ropivacaine during surgery.
The patients were assigned to two groups based on the postoperative analgesia regimen. Patients in Group A were given IV APAP 1g (weight above 50kg) or 15mg/kg (weight below 50kg) every 4-6 hours. In Group C, no regular analgesic was prescribed. Pain intensity, requirement of rescue analgesics, and adverse events were analysed. Abnormally distributed data was compared with the Mann-Whitney's *U* test. Normally distributed data was compared using unpaired Student's *t* test; $p<0.05$ was considered a statistically significant difference.
**Results and discussion:** Of 249 patients 40 met the criteria. Twenty-three were classified as Group A, and 17 were classified as Group C. The number of patients who underwent awake craniotomy was statistically larger in Group C ($p=0.0043$). A greater amount of IV APAP was given to the patients in Group C ($p=0.0076$); though doses of fentanyl ($p=0.0534$), dexamethasone ($p=0.3899$), droperidol ($p=0.0820$) and ropivacaine ($p=0.1795$) did not differ between groups. Numerical rating scale was lower throughout ICU stays in Group A but not significantly different. Three of 23 patients in Group A required rescue analgesics, compared with 8 of 17 in Group C ($p=0.0305$). Total amount of perioperative blood loss was comparable ($p=0.3811$). Hepatic function was well preserved though levels of AST and ALT fluctuated.
**Conclusion:** Regular IV APAP reduces the need for rescue analgesics with postcraniotomy pain after supratentorial tumour removal.

## 06AP03-5

### Impact of corticosteroid therapy and surgery start time on blood glucose variability in patients undergoing brain tumor surgery

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**Background and Goal of Study:** Most patients undergoing brain tumor surgery receive perioperative corticosteroids to reduce tumor-associated edema. However, it has been shown to cause hyperglycemia. The goal of the study was to evaluate influence of corticosteroids and surgery start-time to the variability of blood glucose during perioperative period.
**Materials and methods:** The prospective observational study was carried out at a medical university hospital and 103 adult ASA I-III, treated with dexamethasone non-diabetics patients were involved. All patients underwent brain tumor surgery under general anaesthesia and they received 8 mg dexamethasone i/v during induction. They were grouped by surgery start-time: morning surgery group - A (n=75) and afternoon surgery group - B (n=28). Blood glucose concentrations were measured 5 times within 24 hours in perioperative period. The data is presented as mean±SD. Statistical analysis was performed using Pearson's test, Friedman's test, Student's t test and $\chi^2$ test. $p<0.05$ was defined as significant.
**Results and discussion:** There were no significant differences between the groups regarding demographic data. Results of blood glucose level are shown in the table.

| Glucose test time | A | B | *p* |
|---|---|---|---|
| 09:00pm, day before operation | 6.0±1.8 | 6.2±1.9 | 0.61 |
| 07:00am, operation day | 4.4±1.2 | 4.6±1.0 | 0.50 |
| Anaesthesia induction | 3.6±0.9 | 4.0±1.0 | 0.05 |
| End of operation | 5.2±1.4 | 5.5±1.3 | 0.40 |
| 09:00pm, operation day | 6.6±1.2 | 6.8±1.0 | 0.42 |

*[Blood glucose concentration, mmol/l]*

Preoperative corticosteroid therapy lasted 5.1±0.5 days in group A and 5.9±0.8 days in group B ($p>0.05$). The total dose of dexamethasone did not differ significantly between groups (68.9±5.0 mg vs. 77.9±6.7 mg, $p>0.05$). The total dose of dexamethasone on operation day was significantly higher in group A (15±3.3 mg vs. 13±3.0 mg, $p<0.05$). Blood glucose concentration significantly decreased at preoperative night (group A -2.5±0.3, group B -2.2±0.5, $p<0.05$) and significantly increased during surgery in both groups (1.7±0.2 vs. 1.5±0.2, $p<0.05$), but there were no difference between them ($p>0.05$). Correlation between the total dose of dexamethasone and blood glucose level during perioperative period was not identified.
**Conclusion(s):** The blood glucose level of patients with brain tumor and corticosteroid therapy has increased significantly during operation but it has not depended on surgery start-time. Identified blood glucose variations did not require correction.

## 06AP03-6

### Anesthesia for neurosurgical procedures in pregnant patients: a systematic review

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**Background:** Several neurological diseases have their onset predominantly in pregnancy, such as some brain tumors and cerebrovascular events. They are usually associated with pregnancy-related conditions: vascular endothelial dysfunction and activation of hormonal receptors on cells surfaces.
Aim of this systematic review is to report recent (last 10 years) clinical evidences related to anesthetic management of pregnant females undergoing neurosurgery.
**Methods:** Two medical databases, PubMed and Embase, were queried in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) statement recommendations. Key words used for the literature search were: "Neuroanesthesia & pregnancy" and "Intracranial procedures & pregnancy, "Brain tumor & pregnancy", "Neurosurgery & pregnancy", "Neuroradiology & pregnancy", "Neuroprotection in pregnancy", "Traumatic brain injury & pregnancy". Only complete studies (no abstracts) published in peer-reviewed journals between January 2005 and October 2015 were considered to be eligible. Following criteria were used: language (English); study type (human, clinical article, controlled clinical trial, controlled study, randomized controlled trials, case reports).
**Results:** A total of 567 articles were retrieved using the listed key words and 75 were selected and categorized into 3 subchapters: brain tumors in pregnancy & anesthetic management; brain vascular lesion in pregnancy (acute subarachnoid haemorrhage in pregnancy and stroke in pregnancy) & anesthetic management; traumatic brain injury in pregnancy & anesthetic management.
**Conclusion:** Anesthetic management involves a multidisciplinary team to ensure the best outcome of the mother and fetus. General anesthesia seems to be the most safe during neurological procedures in pregnant patients. Cardiotography (CTG) monitoring seems not useful as a silent CTG is a normal consequence of general anesthetics. Fetal heart rate monitoring is more accurate, can be performed easily during neurological procedures in pregnant patients; it is sensitive marker to obtain significant information about fetal condition during GA.
**Reference:**
Anson JA & al. Anesthetic management of labor and delivery in patients with elevated intracranial pressure. *International Journal of Obstetric Anesthesia* 2015; **24**:2 (147-160).

## 06AP03-7

### Perioperative complications of deep brain stimulation surgery

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**Background and Objectives:** Deep brain stimulation (DBS) provides relief to patients with a variety of movement and other neurological disorders that do not respond to medication.
The primary objective of this study was to evaluate perioperative complications in DBS. As a secondary objective, partial or total withdrawal of antiparkinson drugs after surgery (POTWASDAS) was assessed.
**Material and methods:** A retrospective, observational study was carried out. All patients who had undergone DBS in our hospital were included. They were selected from the follow-up database of the Chronic Pain and Functional Neurosurgery Unit. Gender, years of follow-up, duration of disease, indications and duration of surgery, complications, ICU and hospital length of stay were all collected. POTWASDAS at 1, 6 and 12 months was also recorded.
The variables were analyzed by SPSS.
**Results and discussion:** Forty seven patients were included with an average age of 60.6±8.6 years. The gender distribution was 53.2% males and 46.8% females. The duration of disease until surgery was 12.52 ± 4.83 years. The main indication for surgery was refractoriness to treatment (59.6%) followed by dystonia caused by levodopa (34%).
The duration of surgery was 473.9 ± 112 min. The most frequent intraoperative complication was high blood pressure (HBP) (>30% from baseline) in 48.9% of the patients. Low BP (<30% from baseline), decreased level of consciousness, lack of cooperation and anxiety was found in 4.3%.
As described, our most frequent postoperative complication was HBP in 21.3%. Other complications were anxiety syndrome in 8.5%, low BP, decreased level of consciousness, epileptic crises, infection of the surgical wound and generalized tremors in 4.3%. The ICU and hospital length of stay was 1.18 ± 0.16 days and 15.15 ± 6.68 days respectively.
After one month, it was possible to decrease medication in 40.4% of the patients and withdraw it in 27.7%. In 38% of these patients, it was necessary to reinitiate treatment at one year. Finally, medication could be decreased in 40.4% and completely withdrawn in 4.3%.
**Conclusion:** Perioperative HBP with fear for risk of brain hemorrhage was the most common complication. Monitored anesthesia care along with tight BP control could reduce serious adverse outcomes in DBS surgery patients.
In more than half of the patients, it was possible to withdraw the medication partially at one year. However, complete removal was possible only in a small percentage.

## 06AP03-8

### Evaluation of the efficacy of esmolol and dexmedetomidine on blunting sympathetic stimulation during intracranial procedures

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**Background and Goal of Study:** Perioperative hemodynamic stability is of utmost importance during intracranial procures. Elevation of blood pressure can cause bleeding or edema in the operative field, where an elevation of blood pressure during the recovery period is also associated with postoperative hematoma. B-blockers like esmolol, has been used effectively in blocking perioperative hemodynamic changes during intracranial surgery. Dexmedetomidine, a new alpha2-adrenergic agonists which offers sedation and analgesia with no respiratory depression, gains popularity in neuroanesthesia. This study considers the applicability of these drugs as an adjuvant to neurosurgical case management during fast track anesthesia.
**Materials and methods:** Forty-two ASA I-III patients undergoing intracranial tumor or aneurysm surgery were randomly divided in two groups. After induction in anesthesia, group D (n=15) received dexmedetomidine 1 mcg/kg over 10 minutes followed by 0.7mcg/kg/h, where group E (n=15) received esmolol 500mcg/Kg over 5 min following by 300mcg/Kg/min. Bispectral index was used to maintain a similar level of hypnosis in both groups (40-50). The hemodynamic variables at various stages of surgery (HR-heart rate, MAP-Mean arterial pressure), opioids requirements and recovery characteristics were recorded.
**Results and discussion:** There was no episode of hypotension or bradycardia (HR<45/min) in neither group. Emergence from anesthesia was successful in all patients. There were no significant differences between the two groups in extubation times (E=11.7±3.16min and D=12.3min±1.69, p<0.05). The coefficient of variation for MAP did not differ between groups (p>0.05). However HR was lower in the groupD (p<0.05).A significantly smaller proportion of patients in the DEX group required treatment with antihypertensive medications (1 of 21, vs 5 of 21) during the extubation phase.
**Conclusion(s):** Our study demonstrated that both esmolol and dex could effectively attenuate intraoperative sympathetic overdrive during intracranial procedures. However Dex more effectively prevented the hyperdynamic status throughout the extubation phase.
**Reference:**
1. Asouhidou I, Trikoupi A. Esmolol reduces anesthetic requirements thereby facilitating early extubation; a prospective controlled study in patients undergoing intracranial surgery. BMC Anesthesiol. 2015 Nov 28;15:172.

## 06AP03-10

### A comparison 20% mannitol and 3% NaCl effects on coagulation parameters in vitro by ROTEM: prospective randomized crossover study

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**Background and Goal of Study:** Mannitol and Hypertonic saline (HS) are commonly use to minimize brain volume and intracranial pressure. The aim of present study was to evaluate the effect of 20% Mannitol and 3% HS on hemostasis in whole blood in vitro by ROTEM.
**Materials and methods:** Fifteen volunteer were included in the study(Figure 1).In present study, we simulate to giving 375cc %20 mannitol (1gr/kg) or %3NaCl with/without 500cc HES to 75kg adult patient.Twenty ml blood samples were obtained from participants. In each group 2ml blood were collected into polypropylene tubes for ROTEM analysis and 2ml blood were collected into EDTA tubes for hemogram analysis. After sampling all blood samples were diluted with test solutions(Figure 2). Group C (Control):Only blood,Group M (Mannitol):Seven percent 20% mannitol concentration in the blood, Group HS (Hypertonic Saline): Seven percent 3% HS in the blood Group M/H (Mannitol and HES):Six percent 20% mannitol concentration and eight percent HES in the blood.Group HS/H: (Hypertonic Saline and HES):Six percent 3% HS concentration and eight percent HES in the blood.Thereafter, within 2 hours after blood withdrawal, thromboelastometry coagulation analysis. Automatically measured thromboelastometry parameters were Clotting Time(CT) and Clot Formation Time(CFT) with InTEM, CT, CFT and Maximum Clot Firmness(MCF) with ExTEM and MCF with FibTEM recorded.
**Results:** ExTEM CT value was found significantly longer in Group M/H than the control. ExTEM CFT median and percentile values were Group C:85(70-95)s, Group M:115 (94-128)s, Group HS:102 (84-114)s, Group M/H:128 (110-144)s, Group HS/H:118 (107-132)s (Figure 3). In all study group's FibTEM MCF values were significantly lower than control. Also we found significant diffrent between Group M and Group H

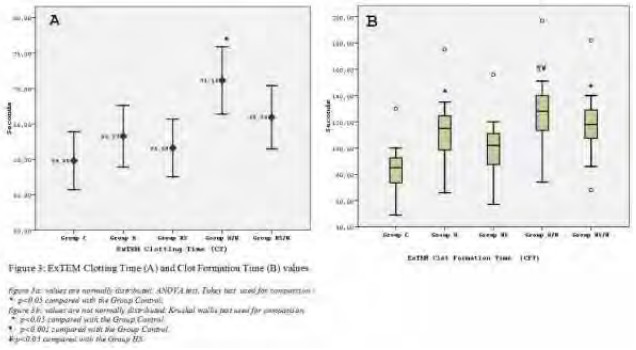


Figure 3: ExTEM Clotting Time (A) and Clot Formation Time (B) values

*[Figure]*

**Conclusion(s):** These results indicate that whole blood coagulation disorder induced by mannitoL and HS are mainly dependent on the final fibrinogen-fibrin interaction.Our results may indicate that 3% HS is more suitable than 20% mannitol during cranial surgery in terms of coagulation.

## 06AP03-11

### Regional anesthesia and sedation technique with dexmedetomidine for awake craniotomy

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**Bakground and aims:** Awake craniotomy allows to maximize lesion resection while sparing language, motor and somatosensorial areas of the brain and to minimize the postoperative neurological deficits[1]. In our hospital, propofol infusion plus remifentanil infusion was the most common option for awake craniotomy. However, patients were sleepy that made it difficult their collaboration during the surgery. Recently, we introduce dexmedetomidine[2] (Dex), a selective α2-adrenoceptor agonist with analgesia, sedation and sympatholysis effects and without respiratory depression. We show our experience using regional anaesthesia plus Dex sedation.
**Methods:** A descriptive study evaluated during 2015, consecutively five patients underwent awake craniotomy to treat supratentorial tumors. Regional anaesthesia using bupivacaine 0.25% with epinephrine, included the blockade of the cranial nerve V (supraorbital, supratrochlear, zygomathicotemporal and auriculotemporal branches) and the occipital nerves. The scalp, and dura were also infiltrated. Dex infusion was started before infiltrating, stopped before mapping and resumed at the beginning of dura closure. For postoperative analgesia, dexketoprofen, paracetamol and morphine were administered.
**Results:** One male and four females (ASA II/III) were evaluated. The following results are expressed as median and quartiles: age 32 [27-49] years old; weight 60 [51-93] kg; length of surgery: 330 [270-360] min. The total bupivacaine was 140 mg. Dex infusion was administered at rate of 0.4 ug/kg/h at the open and closure of craniotomy and stopped during the surgery. No side effects such as nausea, vomiting, local anaesthetic overdose, respiratory depression, hyperalgesia or cardiac instability were observed. One patient presented seizures. There was a low incidence of intraoperative pain.
**Conclusion:** Regional anaesthesia and Dex sedation provided adequate conditions for awake craniotomy. It decreases patients' anxiety, pain medication needs, and level of consciousness without agitation.
**References:**
1. Sarang A, Dinsmore J. Anaesthesia for awake craniotomy. Evolution of a technique that facilitates awake neurological testing. British Journal of Anaesthesia. 2003;90(2):161-5.
2. Bekker AY, Kaufman B, Samir H, Doyle W. The use of dexmedetomidine infusion for awake craniotomy. Anesth Analg. 2001;92:1251-3.

## 06AP03-12

### The effect of pneumoperitoneum and position on the optic nerve sheath diameter during robotic radical prostatectomy: an ultrasonographic evaluation

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**Aim:** The deep trendelenburg position and pneumoperitoneum those applied in cases of Robot-Assisted Laparoscopic Radical Prostatectomy (RALRP) operations are thought to increase intracranial pressure. Orbital ultrasonography as a non-invasive measurement of the optic nerve sheath diameter (ONSD) have been reported in recent years as in correlation with intracranial pressure. In this study, RALRP operations done in different intra-abdominal pressures and the affect of the ONSD with different intra-abdominal pressure levels have been shown. Whether changes made in the cognitive functions of patients has been investigated by this likely effect.
**Materials and methods:** 40patients who RALRP operation planned, ASA physical statusI-II and in ages 50-70 were included to this study. The patients were divided into 2groups; according to insufflation pressure as 10 mmHg (Group I) and 15mmHg (Group II). The optic nerve sheath diameter measuring done for 10 times from the right eye of the patients with its 4 axis by ultrasound; before the induction of anesthesia, 5min after induction, 5min after abdominal insufflation, 5,15,30,60 and 120 min of the trendelenburg position, 5min after intra-abdominal insufflation and trendelenburg terminated and 5min after extubation. Standardized Mini Mental State Examination(SMMSE) was performed 1day before and 3days later the operation.
**Results:** There were no differences between the two groups for the operation time and demographical values.ONSD value was significantly ($p<0,05$) lower in Group I at the 60. and 120.min of the Trendelenburg position and at the 5.min of returning to supine position.There were no difference between preop and postop SMMSE results for the two groups. Mean airway pressure and ONSD values in deep trendelenburg position during operation has increased in both groups compared with baseline values; but they have decreased back to levels similar to their baseline values at the end of the operation parameters with the supine position.
**Conclusion:** These results determined that lower intracranial pressure occurs at the low insufflation group by lower ONSD values with the prolongation of the deep trendelenburg position,but this difference did not make a significant difference in terms of cognitive function,which is viewed by the SMMSE.
**Acknowledgements:** This study was presented at the 49th Annual Meeting of Turkish Anesthesiology and Reanimation Society among first 10 clinical study. (in Turkish language).

## 06AP04-1

### Incidence of surgical wound infections in patients undergoing craniotomy during the period 2007-2014

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**Background and Goal of Study:** The overall incidence of surgical infection in patients undergoing craniotomy is around 5%. Infection rate in our hospital was much higher (14% in 2007 and 12.5% in 2008), for this reason a multidisciplinary working group was created.
**Materials and methods:** The aim of this study was to determine the incidence of nosocomial infection in elective craniotomies (January/2007-December/2015) and to analyze the effectiveness of our therapeutic measures introduced in order to reduce the number of surgical wound infections.
**Results and discussion:** The incidence of wound infection was highly variable: 2009 (5.9%), 2010 (16.7%), 2011 (7.4%), 2012 (9.4%), 2013 (8.7%), 2014 (3.5%). A total of 221 procedures were analyzed between 2012 and 2013. We found a total of 20 postoperative wound infections. We obtained 15 bacterial isolations: S. Aureus (4), S. Epidermidis (1), S. Pyogenes (1), S. Agalactiae (1), Acinetobacter Baumannii (1), Klebsiella Pneumoniae BLEE (2), Klebsiella (1), Bacteroides (1), Enterobacter Cloacae (2), E.Coli (1).
These findings showed that 53 % of the isolated pathogens were gram-negative bacteria that were not covered with the empirical antibiotic prophylaxis made with cefazolin and in 2014th was replaced for cefuroxime. After these changes the rate infection along 2014 was 3.5%, 4 of the 114 craniotomies were infected and 2 cocoas gram-positive were identified.
**Conclusion(s):** Knowledge of the local microbiology of infections is essential to guide both prophylaxis and empirical antibiotic therapy. The multidisciplinary approach of the surgical wound infections helps to enhance the results.

## 06AP04-3

### Complication during deep brain stimulator electrodes placement: a case report

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**Background:** Deep brain stimulator (DBS) placement is a surgical treatment for movement disorders, chronic pain, psychiatric disorder, and a growing number of neurological disorders.This treatment has provided remarkable benefits in Parkinson's disease (PD).
Usually, the anesthetic technique for this procedure ,DBS placement with awake craneotomy, is based on a combination of local anesthesia, sedation and analgesia, which involve substantial risks like hemodynamic instabilities, airway obstruction, hypoventilation, nausea and vomiting, agitation or interference with cortical mapping.
**Case report:** We report the case of a 70-years-old man diagnosed of Parkinson's disease, American Society of Anesthesiologists' physical status II , who was scheduled for awake craniotomy in order to DBS placement . Monitoring included electrocardiography, pulse oximetry, end-tidal $CO_2$ and noninvasive arterial pressure.The awake craneotomy was done with local anesthesia and was sedated using a propofol more remifentanyl infusion .Approximately 120 min after start of surgery the patient presented important agitation and sinus bradycardia of 30 beats/min. Atropine is administred and a general anesthesia with endotracheal intubation was done,the patient sedated was moved to the Surgical Critical Care Unit, after that, a Cranial Computerized Tomography was done which showed no alterations, ten hours later the patient was extubated without complications and the surgery was rescheduled three weeks later.
**Discussion:** The challenge of providing adequate anesthetic care to an awake patient for intracranial surgery requires more than routine vigilance about anesthetic management. Not all patients are fit for awake craniotomy. In the complication of our case we considered, in addition to anxiety symptoms,the possibility of a vasovagal-type reaction or Autonomic dysfunction as a result of PD . We think that general anesthesia can reduced some negative aspects of this surgery such as anxiety or anesthetic concerns about respiratory difficulties.
**Reference:**
1. Danielle Teresa Scharpf , Mayur Sharma, Milind Deogaonkar, Ali Rezai and Sergio D. Bergese.Practical considerations and nuances in anesthesia for patients undergoing deep brain stimulation implantation surgery. Korean Journal of Anesthesiology. Vol 68, nº4, August 2015
**Learning points:** Craneal surgery, awake patient, complication

## 06AP04-4

### Blood glucose management in patients with acute brain injury: a systematic review

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**Background and Goal of Study:** Blood glucose concentration (BGC) management in patients that necessitate an ICU therapy is a debated topic. This task is even more complex in patients with acute brain injury (ABI) because glucose is the metabolite mainly used by neurons and because of the risk of secondary brain injury. Patients with ABI may have suffered of different conditions as traumatic brain injury (TBI), acute ischemic stroke (AIS), intracranial hemorrhage (ICH), subarachnoid hemorrhage (SAH) and these can differently affect the brain function and metabolism. Aim of this review article is to report clinical evidence related to BGC management in ABI patients.
**Materials and methods:** A literature search through PubMed was accomplished.Two authors (F.B. and S.A.) independently screened and assessed titles,abstracts,and the full-text papers, using inclusion and exclusion criteria. A total of 880 papers were screened and 846 were excluded. Selected studies were categorized into 3 subchapters: effects of insulin/other hormones treatment, relationship between BGC and outcome,and impact of nutrition on ABI patients.
**Results and discussion:**
1) Effects of insulin/other hormones treatment: insulin and other hormones like IGF-1 and GLP-1 might have a positive role in preventing ABI -induced hyperglycemia, although they can be associated with higher risk of hypoglycemia episodes.
2) Relationship between BGC and outcome: hyperglycemia affects in patients with ABI and several studies have demonstrated that hyperglycemia on admission is a common in AIS,SAH,ICH etc. High BGC on admission have been related to poor outcome.
3) impact of nutrition on ABI patients: ABI patients experiment a hypermetabolic and hyper catabolic state with a rapid deterioration of body lean mass, therefore enteral nutrition(EN) and parenteral nutrition(TPN) are essential in these cases. Patients receiving TPN are most prone to present higher BGC when compared to those treated with EN.Patients with ABI that receive EN have a better clinical outcome.
**Conclusion(s):** Hyperglycemia is frequent during ABI and is associated with increased morbidity and mortality and poor outcome. It can be effectively treated with insulin infusion with appropriate BGC target. Also other hormones have potential therapeutic effects in BGC management. It is important to provide adequate glucose supply with preferentially with EN.

## 06AP04-5

### Anesthetic management of ruptured AVM with inner aneurysm: neurointerventional radiologist and anesthesiologist hand by hand

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**Background:** Neurointerventional procedures are best conducted under general anesthesia, which allows periods of controlled hypotension, cerebral protection, and minimal movement(1). Anesthesiologist prevents and responds to procedural complications and together with neurointerventional radiologist deals with different working environment and specific requirements(2).
**Case report:** A 27-year old female presented with sudden intensive headache with excessive vomiting. Neuroimaging revealed hemorrhage from AVM with intranidal aneurysm. Medical council decided on neurointerventional procedure in general anesthesia. Midazolam, sufentanyl and propofol were used for induction, with iv bolus of esmolol before intubation. Sevofluran,sufentanyl and norcuron were used for maintance of anesthesia, and monitoring of SpO2, EtCO2, arterial blood pressure and urinary output was performed. Coils were placed using the pressure cooker technique, and embolisation agent was injected intranidaly. Sudden tachycardia and rise in blood pressure occured at the same time the radiologist noticed the rupture of the intranidal aneurysm. Anesthesia was deepened and mannitol infusion started. The radiologist occluded aneurysm by injeting liquid embolic material. After waking up, the right hand paresis and sensomotor dysphasia were present. A control CT scan showed ischemic changes in the left ACM irrigation area. Three months after she still has minor motor dysphasia.
**Discussion:** Anesthesiologist confronts a few moments (induction, intubation, extubation and some neurointerventional maneuvers) when there is need for tight ICP and hemodynamic control. He should be able to respond quickly on radiologist demands, lowering and raising MAP and ICP, using various different drugs and maneuvers, making optimal conditions for performing most delicate procedures on cerebral vascular structures.
**References:**
1. Nadjat-Haiem C, Ziv K, Osborn I. Anesthesia for carotid and cerebrovascular procedures in interventional neuroradiology. Int Anesthesiol Clin. 2009 Spring;47(2):29-43
2. Joung KW, Yang KH, Shin WJ, et al. Anesthetic consideration for neurointerventional procedures. Neurointervention. 2014 Sep;9(2):72-7
**Learning points:** Anesthesiologist awareness and quick response are often vital in case of adverese events during neurointerventional procedures. It seems that performing neurointerventional procedures with a permanent anesthesiology team in the radiology department proves to be invaluable.

## 06AP04-6

### Comparison the effect on cerebral oxygenation by sevoflurane-remifentanil or propofol-remifentanil anesthesia in patients undergoing carotid endarterectomy

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**Background and Goal of Study:** The purpose of present study was to compare the effect of sevoflurane and propofol on regional cerebral oxygen saturation ($SrO_2$) using near-infrared spectroscopy (NIRS).
**Materials and methods:** We randomly allocated 78 adult patients scheduled to undergo carotid endarterectomy (CEA) into 2 groups: Sevoflurane or Propofol group, in that patients were anesthetized with sevoflurane-remifentanil or propofol-remifentanil respectively. Study was performed with two phases: Phase 1 started from monitoring $SrO_2$ before anesthesia induction to clamping the carotid artery; phase 2 started after carotid artery clamping until the end of surgery. $SrO_2$, Bispectral index score (BIS), arterial blood pressure, heart rate, peripheral oxygen saturation, end-expiratory carbon dioxide tension, and concentration of anesthetics were recorded.
**Results and discussion:** There was no difference in the mean and minimum $SrO_2$ before carotid artery clamping. The relative maximum decrease in $SrO_2$ was lower in Sevoflurane group thane Propofol group, measured in contralateral side ($P = 0.033$); whereas, there was no difference in ipsilateral side. $SrO_2$ was significantly decreased after carotid artery clamping and increased after declamping, however, there was no difference between Sevoflurane and Propofol group. Mean arterial blood pressure was lower in Sevoflurane group from the end of carotid artery clamping to the end of surgery ($P = 0.048$), without difference in BIS value
**Conclusion(s):** Propofol-remifentanil anesthesia was comparable with sevoflurane-remifentanil anesthesia undergoing carotid endarterectomy in an aspect of preserving the $SrO_2$ with less decrease in mean arterial blood pressure.

## 06AP04-7

### Density spectral array of BIS VISTA monitoring system during Wada study

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**Background and Goal of Study:** Amobarbital is a very short acting barbiturate which is injected in an internal carotid to perform Wada test for patients eligible for surgery treatment. Using Density spectral array (DSA) of Bispectral index (BIS) VISTA™ Monitoring System (BVMS), we observed alpha oscillations in frontal areas, a characteristic event of general anaesthesia known as "anteriorization"[1]. To confirm these findings, we initiated a retrospective study analyzing the EEG recordings with 10-20 system.
The aim of the study was to compare percentage of alpha power between occipital and frontal areas and differences between both hemispheres when amobarbital was injected.
**Materials and methods:** Six patients underwent intracarotid amobarbital (IA) administration were included in the study. The EEG was recorded during five stages:
A) Epoch 1: baseline EEG, awake patient
B) Epoch 2: left or right anaesthetized hemisphere (ill hemisphere)
C) Epoch 3: washout period
D) Epoch 4: right or left anaesthetized hemisphere (healthy hemisphere)
For each EEG channel the mean alpha absolute power was calculated obtaining a single value for each Epoch. To assess significantly difference between alpha power for each study brain zone and each epoch we used the Wilcoxon signed rank test.
**Results and discussion:** After the administration of barbiturate, there was an increase of alpha oscillations more evident in occipital than anterior area and especially in healthy brain. A slight increase of alpha power was observed in the anesthetized brain.
**Conclusion(s):** DSA of BIS showed that the administration of IA in one hemisphere produced low frequency and alpha oscillations in the EEG of occipital and frontal hemispheres more evident in healthy brain, but patients did not loss the consciousness. The presence of this EEG pattern could be due to some cross-flow of the amobarbital and to an altered connectivity in the non-anaesthetized hemisphere produced by a transient functional disconnection from the injected hemisphere[2].
**References:**
1. Purdon P et al. Clinical Electroencephalography for anesthesiologists. Anesthesiology 2015, October;123(4):1-24.
2. Douw L, Baayen JC, Klein M et al. Functional connectivity in the brain before and during intra-arterial amobarbital injection (Wada test). Neuroimage 2009;46:584-8.

## 06AP04-8

### Hypertonic saline on brain relaxation during supratentorial tumor craniotomy: a dose-comparative study

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**Background:** Evidence from RCTs suggest that hypertonic saline (HS) is at least as effective, if not better than mannitol for treatment of increased ICP. According to a recent meta-analysis comparing intraoperative effects of HS and mannitol in craniotomized patients, HS could significantly increase the odds of satisfactory intraoperative brain relaxation. No prospective studies stated a dose-response relationship of HS on brain relaxation in surgical setting. A prospective, randomized, double-blind study was designed to assess differences in brain relaxation between 2 doses of 3% HS during elective supratentorial brain tumor surgery.
**Methods:** 30 patients undergoing supratentorial craniotomy for tumor resection were enrolled to receive either 3 ml/Kg (group L) or 5 ml/Kg (group H) of 3% HS administered at skin incision for 15 min. Brain relaxation was assessed after dura opening on a scale ranging 1-4 (1= perfectly relaxed, 2= satisfactorily relaxed, 3= firm brain, 4= bulging brain). Hemodynamic variables, temperature, urine output, fluid balance, blood loss and laboratory values (blood gases, osmolarity, hematocrit, glycemia, lactate) were collected before HS infusion and 30, 120 and 360 min after it. Head position, type and location of lesion, presence and magnitude of midline shift, extubation time, postoperative complications, ICU and hospital stay were also recorded as well as 30 day mortality.
**Results:** No significant differences between groups were found regarding age, gender, BMI and brain tumor location or size. In group L 46 % of patients (group H, 61 %) presented a midline shift ($P$= 0.362). Median scores of brain relaxation (interquantile range) were 1.5 (1-2.75) and 2.0 (1.5-3) ($P$=0.211) for patients in groups L and H, respectively. If adjusted for the presence of midline shift, the use of a higher dose of HS resulted in an odds ratio of 0.444 (0.214-0.923) ($P$ =0.057) and use of a lower dose resulted in 0.800 (0.126-5.092) ($P$=0.813). So regarding effect of midline shift, relaxation score is not affected by the dose used of HS. No significant differences in postoperative complications and length of stay were observed.
**Conclusions:** 3 ml/kg of 3% HS results in similar brain relaxation scores as 5 ml/kg in patients undergoing craniotomy for supratentorial brain tumor. If adjusted for the presence of midline shift, patients in the higher dose group had not significantly differences in relaxation scores compared with the lower dose group.

## 06AP04-9

### Bispectral Index monitoring as an indicator of acute cerebral events - a case report

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**Background:** Bispectral Index (BIS) is based on a mathematical analysis of processed electroencephalogram (EEG) validated for anesthetic depth monitoring. BIS sudden fluctuations have been associated with clinically relevant cerebral hypoperfusion with prognosis impact[1].
**Case report:** A forty two years-old man, smoker, chronically exposed to wood dust, presented with holocranial headaches and epistaxis for the past nine months. No deficits were found on neurological examination. Imaging studies and biopsy showed ethmoidal sinus adenocarcinoma with intracranial invasion and he was scheduled for endoscopic nasosinusal surgery.
Upon arrival to the operation room, patient was monitored according to ASA standards and added a BIS electrode. An initial BIS of 72, with a Signal Quality Index (SQI) of 100% and a Suppression Ratio (SR) of 0% was associated to lorazepam prescribed previously in the ward. Induction of general anesthesia was performed and maintained with sevoflurane and TCI remifentanil, Minto model, Effect-Site Concentration 2-10 ng/ml. Surgery and anesthesia went uneventfully. BIS was maintained between 20-40 with a SQI 18-100% and a SR 0-2%.
After 200 mg of sugamadex, emergence of anesthesia was attempted. Almost immediately, a sudden decrease of BIS to 0 was noted with a sustained rising of SR to 100%. He was intubated but in spontaneous ventilation and hemodynamically stable. Pupils were mydriatic. Emergent cranial Computerized Tomography identified cerebral edema and probable cerebral acute hemorrhage. He was then transferred to the Intensive Care Unit (ICU). Neurosurgery team decided there were no criteria for surgery. His condition deteriorated and hemodynamic instability supervened. During ICU stay BIS kept on 0 with a SR and a SQI of 100%. Next day, brain death tests performed were positive.
**Discussion:** The abrupt decrease of BIS and the increase of SR were indicators of an acute cerebral dysfunction. Its suspicion decreased the time frame to perform an image study. Although not validated as an indicator of cerebral perfusion, processed EEG is a predictor of global acute cerebral events. Cerebral hemorrhage is described as a complication of these surgical procedures and often associated with bad prognosis.
**Reference:**
1. Myles, P. et al (2004). "Artifact in the bispectral index in a patient with severe ischemic brain injury." Anesth Analg **98**(3): 706-7
**Learning points:** Sudden fluctuations in BIS should alert to acute cerebral events.

## 06AP04-10

### Sitting position in neurosurgery: does venous air embolism prolong length of stay in neurosurgical intensive care unit?

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**Background and Goal of Study:** Sitting position in neurosurgery is used in posterior cranial fossa and medulla oblongata surgery. One of the most common and most severe complication of operations in this position is venous air embolism (VAE). Incidence varies depending on the method used to detect VAE, being as high as up to 76% when transesophageal echocardiography monitoring is used. (1)
The aim of this study was to determine the difference in duration of stay in neurosurgical intensive care unit (NICU) for patients operated in sitting position with and without venous air embolism.
**Materials and methods:** In our study we included 114 patients of all ages operated in sitting position from January 2011 to May 2015. All patients underwent total intravenous anesthesia with thiopental/propofol and fentanyl, and they all had central venous catheter. VAE monitoring included clinical acknowledgement (sudden decrease in end-tidal CO2, sudden decrease in mean arterial pressure, increase in difference between end-tidal and arterial CO2).
**Results and discussion:** VAE was observed in 26 out of 114 patients in sitting position. The duration of their stay in NICU was in range of 1 to 13 days (2,65±2,62) versus patients without VAE, range 1 to 29 days (2,60±3,47). To test our hypothesis we used t-test (t=0,0679, P=0,9460).
**Conclusion(s):** We have found no statistical difference in the length of stay in the NICU between patients who have suffered from VAE during sitting position neurosurgery and those who have not.
**Reference:**
1. Porter JM, Pidgeon C, Cunningham AJ Br J Anaesth. 1999; 82(1):117-28

## 06AP04-11

### Inter-patient variability of propofol requirements for anesthesia

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**Background:** We have recently reported[1] a magnitude of more than 250% in individual variability in propofol dose requirements for induction of anesthesia, a result released to the press by the ASA2.
In the present study we assess the variability of propofol requirements for induction, maintenance and recovery.
**Methods:** Under IRB approval, 53 patients undergoing neurosurgery received fentanyl (3ug/kg) followed by 1% propofol at 3.3ml/kg/h until LOC (modified OAAS score of 0). Propofol and remifentanil cerebral concentrations (Ce) were calculated using Schnider's and Minto's PK models. At LOC the amount of propofol given and the predicted Ce were noted and the pump (Fresenius Orchestra) was switched to effect-site TCI. Propofol was titrated to a BIS of 40-60. Remifentanil by TCI was started 30min after LOC, titrated during surgery. At the end of surgery it was set at a Ce of 2ng/ml and propofol was stopped. The patient was called every 10sec. At eye opening (ROC) propofol Ce was recorded. Propofol administered for LOC and from tracheal intubation until it was stopped at the end of surgery was calculated, both in mg/kg/h and in average Ce. Ce at ROC was noted. Data are mean±SD. Statistics used Pearson correlation.
**Results:** Table 1 presents the results. Variability of propofol Ce at LOC, during maintenance and ate ROC was, respectively, 605%, 521% and 692%. Variability in dose of propofol during maintenance (mg/kg/h) was 496%.

| | Statistics | | | |
|---|---|---|---|---|
| | Minimum | Maximum | Mean | SD |
| Propopofol Ce at LOC | 1,22 | 7,39 | 4,2338 | 1,55852 |
| Propofol Ce at LOC | 0,00 | 2,69 | 1,1094 | ,46892 |
| Mean Propofol Ce during maintenance | ,87 | 4,55 | 2,1360 | ,73720 |
| Mean Remifentanil Ce during maintenance | ,42 | 4,95 | 2,1674 | 1,06283 |
| Dose of Propofol at maintenance (mg/kg/h) | 1,83 | 9,11 | 4,3908 | 1,61446 |
| Fentanyl Ce at LOC | 2,80 | 4,50 | 3,3917 | ,42006 |
| Duration of maintenance (h) | ,77 | 11,00 | 3,3262 | 2,08343 |
| Infusion velocity of propofol (mg/h) | 115,10 | 603,74 | 296,1104 | 106,78330 |
| Age | 26 | 79 | 56,70 | 13,151 |
| Height | 1,48 | 1,85 | 1,6430 | ,07819 |
| Weight | 41,00 | 99,00 | 68,3962 | 12,18028 |
| BMI | 14,70 | 36,13 | 25,3034 | 3,85078 |

*[Table 1- Statistical Results]*

**Conclusion:** We show a variability of around 5-fold in individual propofol requirements for induction, maintenance and recovery. This is clinically relevant and it was observed when concentrations were calculated, taking already into account age, gender, weight and height. It provides evidence that other variables contribute to a significant inter-individual variability and supports the need to individualize anesthesia.
**References:**
1. J Neurosurg Anesthesiol 27,4,2015,431-32
2. https://www.asahq.org/about-asa/newsroom/news-releases/2015/10/medication-dose-needed-for-general-anesthesia-varies-widely?year=2015&month=10
**Acknowledgements:** FCT-UID/SEM/50022/2013; SFRH/BD/98915/2013

## 06AP04-12

### Retrospective analysis of airway management, intraoperative hemodynamics and postoperative complications in patients with Atlanto-axial dislocation

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**Background and Goal of Study:** Atlanto-axial dislocation(AAD) is highly unstable and usually fatal injury, it is at high risk of life threatening neurological injury hence cervical spine management is essential. Patients undergoing surgery pose various challenges to the anaesthesiologists with respect to airway management, intraoperative hemodynamics and postoperative recovery. This study is to provide an update on airway management , intraoperative hemodynamics and postoperative recovery & complications in patients of Atlanto-axial dislocation.
**Materials and methods:** After ethics committee approval, we retrospectively analysed records of patients operated for AAD at neurosurgery department of K.E.M. Hospital, Mumbai from march 2012 to march 2015. Difficult intubations were anticipated on basis of (all 3) = MPC-III or IV , Sterno-mental distance =<12.5cm, mouth opening =<3 fingers. Airway intervention techniques, number of attempts, intraoperative hemodynamics, postoperative recovery & complications were recorded and analysed.
**Results and discussion:** After analysis of recorded data, 105 patients underwent surgery for AAD during the study period. Manual in line stabilization was used in all patients. Various Airway intervention techniques used were: Airtraq in 7(6.67%) patients, McGRATH 2(1.90%), McIntosh 69(65.71%), McCoy 13(12.38%), ILMA 14(13.33%) respectively. Anticipated difficult intubations were in 38 (36.2) patients. Amongst total, Successful intubations in 1st attempt were =Airtraq 6(85.7%), McGrath 2(100%), Macintosh 35(50.7%), McCoy 4(30.8%),ILMA 7(50%), And amongst difficult intubations were=Airtraq 2(66.7%), McGrath 2(100%), Macintosh 5(22.7%), McCoy 0(0%), ILMA 2(40%). Intubations requiring >2 attempts =Airtraq 1(33.3%), McGrath 0(0%), Macintosh 13(59.1%), McCoy 5(83.3%), ILMA 1(20%).
Major blood loss was recorded in 24 (22.86%) patients. 5 patients had bradycardia and hypotension intraoperatively. Post-operatively, 4 patients were neurologically same and 2 were deteriorated. Post-operative mortality recorded in 5 patients.
**Conclusion(s):** Indirect laryngoscopes- McGRATH and AIRTRAQ was better than other intubation techniques. Major blood loss had higher incidence of postoperative ventilator support & mortality. No overall correlation between postoperative ventilatory support & neurological deterioration with intubation technique. Missing data & unavailability of fiberoptic bronchoscope (FOB) were major limitations.

## 06AP05-1

### RNase treatment attenuated hepatic ischemia-reperfusion induced cognitive dysfunction through inhibition of inflammation in aged mice

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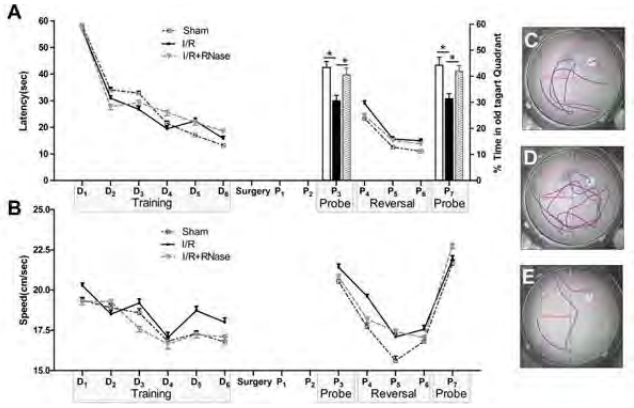
**Background and Goal of Study:** Hepatic ischemia-reperfusion (I/R) injury could lead to tissue damage, organ dysfunction and increased mobility and mortality. Previously, memory retention impairment was reported after liver I/R. Also, we have demonstrated that RNase treatment could attenuated unilateral nephrectomy-induced cognitive impairment. However, role of RNase administration in hepatic I/R induced cognitive dysfunction is still unknown. Therefore, we sought to investigate whether RNase treatment could mitigate hepatic I/R associated cognitive impairment.
**Materials and methods:** After approval from the Institutional Animal Care Committee of Sichuan University, C57BL/6 male mice aged 12 months were randomly assigned to 3 groups: sham surgery plus placebo (Sham), I/R surgery plus placebo (I/R), and I/R surgery plus RNase (I/R+RNase). A nonlethal model of segmental hepatic warm liver I/R model was established by occlusion of the portal triad to the left and median liver with a microvascular clamp followed by reperfusion after 60 min. The I/R+RNase group received 3 doses of subcutaneous injection of RNase respectively as reported previously. Morris Water Maze was used for cognitive assessment. Hippocampal cytokine mRNA levels and serum cytokine protein levels were measured by qRT-PCR and the ELISA kits respectively.




*[Fig 1]*

**Results and discussion:** RNase treatment led to significantly increased percentage time spent in old quadrant on day 3 and day 7 respectively, as compared with untreated I/R group in the probe tests (40.54±2.63 vs. 30.60±2.08 and 41.85±2.29% vs. 31.34±1.96%, *P<0.05, respectively) (Fig 1A), indicating RNase could attenuate cognitive impairment induced by liver I/R in aged mice. After 24 h reperfusion, RNase treatment significantly reduced serum protein levels of IL-1β and IL-6, and hippocampal mRNA levels of them were also significantly dicreased in the I/R+RNase group compared with the I/R group (data not shown).
**Conclusion(s):** This study demonstrated that:
1. RNase treatment may attenuate hepatic I/R induced cognitive impairment;
2. Cognitive protective effect of RNase may be associated with reduction of peripheral and hippocampus inflammation.

## 06AP05-2

### Angiogenesis in the brain after sevoflurane anesthesia in rats

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**Background and Goal of Study:** Although degeneration of brain cells including apoptosis has been demonstrated after inhalation of volatile anesthesics in many reports, there is little information about the restoration process of the damaged cells after inhaled anesthesia. To approach the restoration process in the brain cells, we compared the ultrastructural changes in the brain cells just after sevoflurane anesthesia and those 7 days after sevoflurane anesthesia in rats.
**Materials and methods:** We divided SD rats into three groups: the group just after sevoflurane, the group 7 days after sevoflurane and the control group. Rats were anesthetized with 2% sevoflurane, 33% oxygen in nitrogen for 2 h in the group just after sevoflurane. Just after the end of anesthesia, the chest was opened under intraperitoneal (IP) pentobarbital anesthesia. A catheter was inserted through the apex of the left cardiac ventricle for infusion of 0.1 M cacodylate buffer. The right atrium was inserted to drain the perfusion fluid. These were postfixed in 2% glutaraldehyde solution. The brain was embedded in Epon, and ultrathin sections were made. These were stained with lead citrate and uranyl acetate and were observed in a transmission electron microscope (H-7650, HITACHI, Tokyo, Japan).
The group seven days after sevoflurane and the control group were anesthetized with IP pentobarbital. The other treatments were the same as the group just after sevoflurane.
**Results and discussion:** In both of the sevoflurane groups, there were many degeneration cells with atrophic nuclei in both cerebral cortex and hippocampus. In the group 7 days after sevoflurane, many capillaries of a few micro-meter in diameter were found. Its endothelial cells had large nuclei, various rich organelle and small vascular cavity. The characteristics of these vessels were immature blood vessel (1). These vessels described above were not found in the just after sevoflurane and the control groups. These findings suggest that angiogenesis is induced in the restoration process of the degenerated brain cells after sevoflurane inhalation.
**Conclusion(s):** We found many degeneration cells and possible angiogenesis 7 days after sevoflurane anesthesia in the rat brain. Angiogenesis is likely to be induced in the restoration process of the degenerated brain cells caused by sevoflurane anesthesia.

**Reference:**
1. Hannah RS, et al. Anat Rec 178: 691-710, 1974.

## 06AP05-3

### Ciproxifan, a histamine $H_3$ receptor antagonist, suppresses depolarization-evoked glutamate release in rat cerebrocortical nerve terminals via protein kinase A and mitogen-activated protein kinase signaling pathways

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**Background and Goal of Study:** Histamine has long been studied for its inflammatory activity. Several recent studies have also demonstrated that $H_3$ receptor antagonists possess neuroprotective effect. However, the underlying mechanisms of the neuroprotective property of $H_3$ receptor antagonists have not been fully investigated. Given that glutamate plays a pivotal role in neuroprotection, the goal of this study was to examine the effect of $H_3$ receptor antagonists on presynaptic glutamate release and elucidate the underlying mechanisms.
**Materials and methods:** Isolated nerve terminals (synaptosomes) purified from male Sprague-Dawley rat cerebral cortex were used to examine the effect of ciproxifan, an $H_3$ antagonist, on glutamate release evoked by 4-aminopyridine (4-AP). Pharmacological activators and inhibitors of protein kinase cascades were used to investigate the possible downstream signaling pathway.
**Results and discussion:** Results showed that ciproxifan exhibited a concentration-dependent inhibition of 4-AP-evoked glutamate release. In addition, this inhibition was prevented by chelating the intrasynaptosomal $Ca^{2+}$ ions and by the vesicular transporter inhibitor, but was insensitive to the glutamate transporter inhibitor. The inhibition of evoked glutamate release was abolished by blocking the Cav2.2 (N-type) and Cav2.1 (P/Q-type) channels, but not by blocking intracellular $Ca^{2+}$ release. Inhibition of protein kinase A (PKA) and mitogen-activated protein kinase (MAPK) also prevented the inhibitory effect of ciproxifan on evoked glutamate release.
**Conclusion(s):** Our results suggest that ciproxifan inhibits glutamate release from rat cortical synaptosomes through the suppression of presynaptic voltage-dependent $Ca^{2+}$ channels and both PKA and MAPK signaling cascades. These findings may delineate the possible neuroprotective mechanisms of $H_3$ antagonists.
**Acknowledgements:** This work was supported by the grants from the Ministry of Science and Technology of Taiwan, Republic of China (MOST-104-2314-B-418-001 and MOST-103-2314-B-418-006)

## 06AP05-4

### Neurotoxicity of different amyloid beta subspecies in mice and their interaction with isoflurane anaesthesia

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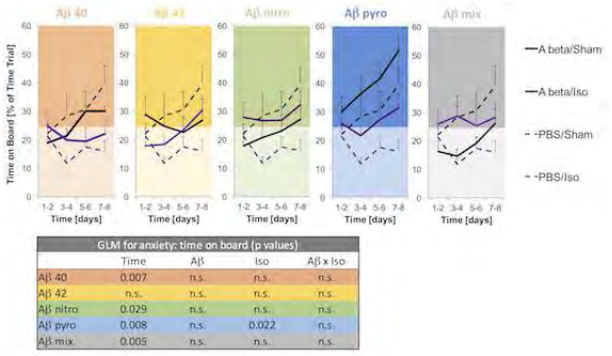
**Background and Goal of Study:** Aim of this study was to assess the neurotoxicity of different amyloid beta (Aβ) subspecies that have been identified in the pathogenesis of Alzheimers' disease and their interaction with isoflurane anaesthesia in mice.
**Materials and methods:** After governmental approval cannulas were implanted in the lateral cerebral ventricle of 72 male, adult C57Bl6N mice. 14 days later they were injected with Aβ1-40 (Aβ 40), Aβ 1-42 (Aβ 42), 3NTyr10-Aβ (Aβ nitro), AβpE3-42 (Aβ pyro), a mixture of the above four (Aβ mix), or phosphate balanced saline (PBS). Four days after injection we anaesthetized half of the mice in every group with isoflurane (Iso) for two hours while in the others a "sham" anaesthetic procedure (transport to the lab, handling, etc.) was performed. During the next eight consecutive days we evaluated behavioural and cognitive performance of the mice using the modified hole board test. Data was analysed using general linear modelling (GLM).
**Results and discussion:** The percentage of total time the mice spend investigating a board with baited holes is presented in the figure as time on board (TOB). Increase in TOB is a sign for less anxiety as the mice start to explore their surrounding. Anxiety significantly decreases in groups Aβ 40, Aβ nitro, Aβ pyro and Aβ mix over time reflecting a habituation to the test. This effect is revoked by Aβ 42 (GLM Time: n.s. not significant). The mice in the Ab pyro group without anaesthesia show a trend to less anxiety, which is increased after isoflurane anaesthesia (GLM Iso: p=0.022).
**Conclusions:** Aβ 42 is more toxic than other Aβ subspecies leading to increased anxiety, which is discussed as one of the first symptoms of behavioural disorder in Alzheimers' disease. (1) Isoflurane alters behaviour in mice dependent of the Aβ subspecies injected.
**References:**
1. Ringman JM, et. al. Brain. 2015 Apr; 138(Pt 4):1036-45.
Figure legend: Time on board in percentage of total trial time. The area in lighter colour represents pathological values. Aβ x Iso interaction between Aβ and Isoflurane




GLM for anxiety: time on board (p values)

| | Time | Aβ | Iso | Aβ x Iso |
|---|---|---|---|---|
| Aβ 40 | 0.007 | n.s. | n.s. | n.s. |
| Aβ 42 | n.s. | n.s. | n.s. | n.s. |
| Aβ nitro | 0.029 | n.s. | n.s. | n.s. |
| Aβ pyro | 0.008 | n.s. | 0.022 | n.s. |
| Aβ mix | 0.005 | n.s. | n.s. | n.s. |

*[Time on board]*

## 06AP05-5

### Glutamate excitotoxicity correction with amantadine on severe TBI

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Excitotoxicity theory adequately explains the mechanisms of neuronal deaths. Glutamate activated calcium cascade excessive release of excitatory neurotransmitters of glutamate and aspartate from terminals of ischemic neurons in the extracellular space.
One of the promising areas of post-ischemic cerebral homeostasis correction is the use of drugs designed to interrupt the fast reaction of glutamate-calcium cascade like amantadine sulphate, previously positioned only as antiparkinsonian.
**Goal of the Study:** To study the efficacy of amantadine sulphate in patients with severe traumatic brain injury for an early correction of glutamate excitotoxicity.
**Materials and methods:** 60 patients with a diagnosis of severe TBI. Open prospective study on the type of "case-control". Inclusion criteria: patients with severe TBI; GCS from 4 to 8 points. Group 1 consisted of 30 patients treated with the standard protocol. Group 2 - 30 patients who received, in addition to treatment protocol, amantadine sulfate, which is used at a dose of 200 mg per day i.v. for 7 days. Patients were examined neurological (lobular and dislocation symptoms, GCS); the study of cerebral blood flow by means of transcranial Doppler; EEG topographic mapping; variation pulsometry; CT brain.
**Results:** Patients in group 2 level of consciousness by GCS increase were found statistically significant ($p \leq 0.05$, TW, MCC). changes in the indices of the spectral power of EEG and heart rate variability observed: reduction of the absolute spectral power of delta rhythm and relative spectral power of delta - EEG activity by more than 30% reduction in theta rhythm AFM; fall in VLF%; a sharp decline in the 1st integral factor in the left hemisphere. Previously were demonstrated that the basic EEG parameters activation of glutamate receptors are increased rhythms in the range of 0.5-3 Hz (delta activity) when loosening in the frequency band 8-26 Hz (alpha and beta rhythm). This changes were observed in group 2.
**Conclusion(s):** In patients with severe traumatic brain injury in response to the use of amantadine sulfate were marked EEG predictors of depression glutamate excitotoxicity: reducing the absolute spectral power of δ-range growth

of α-, β1- and β2- range of 2-4 hours. change combined with the increasing power of the low-frequency spectrum of HRV, reflecting the activation of stress adaptation mechanisms

**Acknowledgements:** This work was conducted in Donetsk National Medical University

## 06AP05-6

### Anaesthesia and consciousness-promising field for future research

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**Background and Goals:** Review and enhance the links between consciousness and anesthesia.
**Methods:** As part of an investigation project, research on PubMed database of the terms anaesthesia, pain and consciousness.
**Results and discussion:** There is no concept formally defined to consciousness and its physiology is still to be discovered. Medicine describes essentially two types of consciousness: arousal and awareness. Some of the states of arousal are: wakefulness, sleep, minimal consciousness, vegetative state, coma and brain death. If we can't measure awareness, how can we be sure about brain death and decide organ donation?
For science, the brain acts according to Hodgkin-Huxley model. In the 80s, neuroscientists announced the theory of corticothalamic oscillations. After that, the *Neural Correlates of Consciousness*, highlights minimum neural mechanisms for conscious perception. Other approach is given by the study of how consciousness can be generated by a physical system - *Integration Information Theory*. Anaesthetist SHameroff and physicist came together with the *Orch-Or Theory*, defending consciousness takes place inside microtubules in neurons by integration of potentials through gap junctions and directed towards different foci in the brain according to the spatial patterning of the gap junctions. Neuroimaging suggests the thalamus can function as a switch of consciousness, and anesthesia is fundamental in this field of study since it functions by deactivating and disrupting corticothalamic integration, according to anaesthetist MAlkire's work.
Other questions not answered by corticothalamic oscillations include daydreaming and memory. To answer, the concept *default mode network* emerged. It's a network of brain regions structural and functionally connected, activated when the individual isn't focusing on the outside world, but when is awake and resting. Is characterised by neuronal oscillations at a rate lower than 0.1 Hz. Functionally is removed from sensory processing and is engaged in metacognitive operations. It seems to be a key to construction of the "self". The pathology involving it is found in psychiatric diseases, but also in chronic pain syndromes. If we act on "self" observation and on these regions of the brain, will this bring changes to pain management?
**Conclusion:** These considerations suggest anaesthesia can help understand the physiology of the brain, improving our knowledge and bringing unimaginable change to medical practice.

## 06AP05-7

### Combining 2-iminobiotin and hypothermia for reducing hypoxia-induced brain damage: Implications from a human cell culture model of hypoxic-ischemic brain injury

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**Background and Goal of Study:** Perinatal asphyxia represents one of the major causes of neonatal morbidity and mortality. Hypothermia is currently the only established treatment for hypoxic-ischemic encephalopathy, and no specific pharmacological therapy exists so far. We have shown that the biotin analogue 2-iminobiotin (2-IB) is able to reduce neuronal cell damage both in vitro as well as in vivo. Here we evaluated whether 2-IB has the potential to attenuate hypoxia-induced injury of neuronal cells also under hypothermic conditions.
**Materials and methods:** In-vitro hypoxia was induced in cultures of IMR-32 cells. After the hypoxic injury, cells were incubated with vehicle or 2-IB (10, 30, 50, 100 and 300ng/ml) under hypothermic conditions (33.5°C). Cell damage was analyzed by LDH assays. Production of reactive oxygen species (ROS) was measured using fluorometric assays. Westernblotting for PARP and phosphorylation of akt and erk1/2 was performed.
**Results:** Hypoxia led to morphological signs of cell damage. Under hypothermia, LDH measurements revealed a significant LDH increase earliest at 25h after the hypoxic insult ($p<0.01$ vs normoxia), while under normothermic conditions comparable cell damage was already detectable after 17h. The post-hypoxic application of 2-IB significantly reduced the hypoxia-induced LDH release under hypothermia (10ng/ml, $p<0.001$; 30ng/ml, $p<0.01$; 50ng/ml, $p<0.01$; 300ng/ml, $p<0.05$; all vs vehicle control). Application of 2-IB (30ng/ml) after hypoxia attenuated the hypoxia-induced ROS production under hypothermic conditions (hypoxia: $p<0.01$ vs normoxia; hypoxia+2-IB: $p<0.05$ vs normoxia). Higher concentrations of 2-IB were less effective in reducing hypoxia-induced ROS generation. Culture medium concentrations of hydrogen peroxide were 9-fold increased by hypoxia under hypothermia ($p<0.001$ vs normoxia) but not influenced by post-hypoxic application of 2-IB. Cleavage of PARP and akt phosphoprylation were by trend increased after the hypoxic insult, while hypoxia significantly increased the phosphorylation of the pro-survival kinase erk1/2 ($p<0.05$ vs normoxia). Addition of 2-IB under hypothermia did not influence cleavage or phosphorylation of any of the mentioned molecules.
**Conclusion:** Low doses of 2-IB can even under hypothermic conditions reduce hypoxia-induced neuronal cell damage *in vitro*. Combination treatment of hypothermia with 2-IB is a promising strategy for reducing hypoxia-induced neuronal injury.

## 06AP05-8

### Dexamethasone promotes the expression of VEGF in glioblastoma stem cells in vitro and in vivo and potentially impacts patient survival negatively

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**Background:** Dexamethasone is widely used to treat cerebral edema in glioblastoma (GBM). However, the drug's impact on the tumor's biology remains unclear. Human glioblastoma stem cells (GSC) have become a reliable model for GBM research and can recapitulate GBM pathogenesis in mouse models. The purpose of this research was to uncover molecular targets of Dexamethasone and their effect on tumor biology.
**Methods:** Isolation of human GSC and all animal work was approved by IRB at MD Anderson Cancer Center. We exposed three independent GBM patient derived GSC lines to clinical relevant doses of Dexamethasone and vehicle controls. The drug's impact on GSC gene and miRNA expression was profiled by microarray assays. Human GSC derived orthotopic tumors bearing nude mice were treated with 2mg/kg Dexamethasone i.p. daily. Immunohistochemical analyses were used to assess tumor properties. Risk scores for genes most affected by dexamethasone, and their associations with GBM patient survival were analyzed in "The Cancer Genome Atlas" (TCGA) cohort (515 patients).
**Results:** GSC exposure to Dexamethasone in vitro and in vivo resulted in an increase of expression levels of vascular endothelial growth factor (VEGF). Pathway analysis further showed a significant inhibition of apoptosis (z-score: -3.122) and activation of survival (z-score: 5.137) of tumor cells and confirmed VGEF as a significantly activated upstream regulator (z-score 3.335). MiRNA target filter analysis further strengthened these findings. Immunohistochemistry of xenograft tumors proved a significant upregulation of CD31, a marker of endothelial cells, in vivo. TCGA patients with a high risk score for the most affected genes (FC > 3.5) had significantly shorter survival (12.8 months versus 16.7 months, $p<0.001$).
**Conclusion:** Dexamethasone exposure induces the expression of VEGF in GSC in vitro and in vivo, thus potentially promoting a more aggressive tumor. Further, risk scores based on dexamethasone dependent genes have prognostic significance for shorter patient survival. Our findings call for additional therapeutics to neutralize this dexamethasone-mediated effects.

## 06AP05-9

### Laryngeal mask ventilation during lumbar spine neurosurgery in knee-chest position is feasible

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**Background and Goal of Study:** The aim of this retrospective study was to describe our experience with LM airway management, including insertion of the device after induction of anaesthesia in prone self-positioned patients undergoing lumbar spine neurosurgery.
**Materials and methods:** From records we extracted patient data (age, weight, height, body mass index, sex) and anticipated difficult airway.
Outcome variables extracted from records were 1)LM repositioning, 2)orotracheal intubation because of failed LM insertion, and 3)airway complications: laryngeal spasm, bronchospasm, leaks requiring LM repositioning, arterial oxygen desaturation (<95%) and bronchial aspiration. Details of airway management strategies were extracted for intubated patients. Duration of surgery was also recorded.
Statistics were compared between groups with the t test or the chi-square test, as appropriate.
**Results and discussion:** A total of 358 cases were collected from to 2008 to 2013. Tracheal intubation was performed in 108 patients and LM was chosen for 250 patients (69.8%). Intubated patients had a higher mean age and rate of anticipated difficult airway; duration of surgery was longer (P <0.001, all comparisons). LM insertion and anaesthetic induction proved effective in 97.2% of the LM-ventilated patients; seven patients (2.8%) were intubated because of persistent leakage. Incidences with airway management were resolved without compromising patient safety.
Our data support the clinical effectiveness and feasibility of anaesthetic induction and insertion of a LM airway after patients have placed themselves in knee-chest position for lumbar neurosurgery. This approach was effective in 97.2% of the patients in this series, the incidence of complications was low at 2.8%, and the complications that did develop could be resolved in all cases without compromising patient safety.
Even though some clinicians still consider this use of LMs to be an insufficiently safe innovation, our experience supports the view that the approach is a feasible alternative that is likely to become standard practice in the future.
**Conclusion(s):** LM airway management during lumbar neurosurgery in knee-chest position is feasible and safe when the anaesthetist is experienced.

## 06AP05-10

### Effects of prone position and positive end expiratory pressure on intracranial pressure (ICP) in patients undergoing spinal surgery using different surrogate estimations of ICP

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**Background:** Prone position and positive end expiratory pressure (PEEP) can improve gas exchange and respiratory mechanics. However, they are associated with risk of intracranial hypertension. Intracranial Pressure (ICP) can be non invasively estimated by different methods, such as the sonographic measurement of the optic nerve sheath diameter (ONSD), and Transcranial Doppler (TCD) derived formulae, including value derived from pulsatility index ($ICP_{PI}$) and Flow Velocity Diastolic ( $ICP_{FVd}$).
**Methods:** We investigated the effect of the PP and PEEP on ONSD, $ICP_{FVd}$, $ICP_{PI}$ in a prospective study including 30 patients undergoing spinal surgery. One-way repeated analysis of variance (ANOVA), fixed-effect multivariate regression models, Receiving Operator Curve (ROC) and multi-ROC analysis were performed.
**Results:** The mean values of ONSD, $ICP_{FVd}$ and $ICP_{PI}$ significantly increased after change to prone position, but not after PEEP application. ROC and multi-ROC analyses demonstrated that among the non-invasive methods, the mean ONSD resulted to have the highest area under the curve to distinguish change in ICP between supine and prone position, value (0.864±0.0338 [0.789 to 0.920]). A cutoff of 0.43 cm was found useful to distinguish the mean ONSD value between supine and prone with a specificity of 75.0 and a sensitivity of 86.7.
**Conclusions:** All the non-invasive methods demonstrated an increase of ICP in prone position, whilst the effect due to PEEP is negligible. ONSD seems to have the best performance in the detection of position changes. Non-invasive ICP methods can be useful in patients undergoing spine surgery at risk of developing intracranial hypertension.

## 06AP05-11

### Perioperative management of massive bleeding: case report

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**Background:** Pelvic tumor surgeries take a heavy toll on hemodynamics.[1]Early coagulopathy associated with massive bleeding has been recognized as a multifactorial condition[2] and its management requires pre, intra and postoperative measures.
**Case report:** Male patient, 29 years old, with neurofibromatosis type 1 and malignant neurofibroma of the sacrum, scheduled for total sacrectomy by anterior and posterior approaches in two surgeries, separated by one week. Erythropoiesis was optimized with IV ferric carboxymaltose, oral folate and vitamin B12 six days before surgery, achieving an increase of 1g/dl in hemoglobin level (12,4g/dl). Tranexamic acid was used for prevention of fibrinolysis, 1g at induction and 1mg/Kg/h infusion during the entire procedure. Esmolol was infused for deliberate hypotension. Regular laboratorial control of hemoglobin, prothrombin time, partial thromboplastin time, fibrinogen and platelets levels was carried out.
Estimated blood losses of surgeries were 5 and 6,8 liters respectively and a total of 18 units of red blood cells (RBC), 9 units of fresh frozen plasma (FFP) and 8g of fibrinogen were administered intraoperatively.
Postoperatively, the patient was treated with another 4 units of RBC, in order to keep hemoglobin levels >8g/dl, and 2 units of FFP while no evidence of coagulopathy was observed. Dismissal from intensive care unit was possible after 12 days.
**Discussion:** Management of massive bleeding should be based on an individual approach, involving multiple strategies with continuous clinical and laboratorial assessment to achieve a better outcome. Effective teamwork and communication are an essential part of this process.[3]
**References:**
1. Journal of Clinical Orthopaedics and Trauma 4(2013) 164-170;
2. Spahn et al. Critical Care 2013, 17:R76
3. Association of Anaesthetists of Great Britain and Ireland, blood transfusion and the anaesthetist: management of massive haemorrhage. Anaesthesia 2010; 65: 1153-1161
**Learning points:** Although thromboelastography wasn't used, for lack of this hemostatic assay in the hospital where surgery took place, efficient management of massive bleeding was achieved through optimization of erythropoiesis, prevention of more blood loss with tranexamic acid and controlled hypotension. Regular laboratorial control was essential on guiding on blood elements to transfuse in every critical moment.

# Cardiac, Thoracic and Vascular Anaesthesiology

## 07AP01-1

### Preoperative exercise therapy in lung cancer surgery reduces the risk of postoperative pulmonary complications

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**Background and Goal of Study:** Lung cancer patients often present poor cardiorespiratory fitness. Although rehabilitation programs are beneficial in cancer, heart failure, and COPD patients, preoperative exercise interventions have not been thoroughly examined regarding lung cancer surgery.
Our primary aim was to test the influence of a short-term high-intensity training (HIT) program on postoperative complications. Secondary aims entailed the impact of HIT on aerobic exercise capacity.
**Materials and methods:** Patients scheduled to undergo lung cancer resection were randomized into usual care (UC) and rehabilitation (rehab) arms. Physiotherapists conducted preoperative rehabilitation, which consisted in 2-3 HIT sessions/week. Functional assessment included peak oxygen uptake ($VO_{2peak}$) and anaerobic threshold (AT) during cardiopulmonary exercise testing and the 6 minute walking test (6MWT). Postoperative clinical outcome data included 30-day mortality, ICU stay, and any organ dysfunction. A bundle of perioperative interventions was administered to both groups to minimize postoperative pulmonary complication (PPC) incidence.
We analyzed UC and rehab group differences. The unpaired Student t test or the Mann-Whitney U-test were used for continuous variables, while the Pearson $\chi 2$ was used for dichotomous variables. Within-group changes over time were investigated with the paired Student t or Wilcoxon signed-rank tests.
**Results and discussion:** A total of 189 patients were screened over 3 years, and 151 were analyzed (UC N=77, rehab N=74). The two groups were comparable regarding patient and surgical features. The median enrollment to surgery time was 26 days (interquartile 25-75%, 21-33 days].
As shown in figure 1, rehab patients presented significant increases in $VO_{2peak}$, AT, maximal power, and walking distance after completing the HIT program. Conversely, UC patients had significant decreases in $VO_{2peak}$, AT, and 6MWT walking distance.
At least one major postoperative complication occurred in respectively 35% and 51% of rehab and UC patients (OR 0.56; 95% CI 0.29-0.1.07; p=0.080). PPC incidence was lower in the rehab group (rehab 23.0% vs UC 43.9%, p=0.018), with a significant reduction in the occurrence of atelectasis (12.2% vs 36.4%, p<0.001).
**Conclusion:** This study showed that HIT preparation of patients scheduled to undergo lung cancer resection enhanced aerobic fitness and resulted in fewer PPCs, compared with patients receiving usual care.

## 07AP01-2

### Double lumen tube with bronchial blocker for lobar isolation in infected lung surgery

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**Background:** Healthy lung or lobes isolation is an absolute indication for selected surgical settings and medical conditions such as thoracic surgery in lung infection. Different methods have been described and used to isolate 1 lung or lobe/s, including the double-lumen endotracheal tube (DLT) and a variety of bronchial blockers (BBs). We present two cases with lung infection in which the isolation was made by combining DLT + BB.
**Case report:**
Case 1: 22-years-old man diagnosed with lung aspergilloma within the residual tuberculous cavity in the upper left lobe. The surgeon requested selective resection of this lobe.
Case 2: 50-year-old man diagnosed with lung abscess in the left lower lobe with suspected neoplasia, proposed to lobectomy. In both, airway management was a combination of left DLT with a BB, using the flexible fiberoptic as a guide to place the BB throught the endobronchial lumen of DLT. I n case 1 a Cohen BB was used; in case 2, an Arndt BB was chosen. After BB placement, the corresponding lobes were isolated and remained so until before the bronchus section.
This method of isolation prevented in both cases the spread of infection to healthy areas of the lung during the perioperative surgical manipulation obtaining a good result clinical-surgical.
**Discussion:** The fine balance between providing satisfactory surgical exposure and manteining adequate oxygenation is a challenge, but in these cases, isolation was even more essential. For this, the anesthesiologist has several devices for airway management.
Some experts recommend DLT for lung isolation for its shorter insertion and less need for repositioning; Others exposed that the BB have lower complication rate with the same efficiency as DL. However, it is also described the combination of placing both devices (DLT and BB), as presented in our cases, providing an excellent isolation and results.
**References:**
1. Narayanaswamy M, et al. Choosing a lung isolation device for thoracic surgery: a randomized trial of three bronchial blockers versus doublé lumen tubes. Anest Analg 2009; 108(4):1097-101.
2. Clayton-Smith A, et al. A comparison of the efficacy and adverse effects of double lumen endobronchial tubes and bronchial blockers in thoracic surgery: A systematic review and meta-analysis fo randomized controlled trials. J Cardiothorac Vasc Anesth 2015; 29(4):955-66.
**Learning points:** Combining DLT + BB could be an option to take in consideration in lung infection thoracic surgeries.

## 07AP01-3

### Does high gradient between arterial and end-tidal pressure CO2 predicts pulmonary and systemic imflammatory response in lung resection surgery?

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**Background and Goal of Study:** End-tidal $CO_2$ pressure ($ETCO_2$) monitoring reflects arterial $CO_2$ ($PaCO_2$) and is standard monitoring in general anesthesia. However, several factors may be responsible for discrepancies between ET-CO2 and PaCO2, including patient-related factors as ventilation-perfusion mismatch and dead space. Patients with higher dead space have an increase in the risk of pulmonary complications after surgery.
The goal of our study was analyze the relationship between CO2 gradient during thoracic surgery and perioperative inflammatory response.
**Materials and methods:** We design a prospective study (a substudy of NCT 02168751). 175 patients who undergo lung resection surgery and voluntarily accept to participate in the study by giving their signed inform consent, were consecutively recruited. All the patients were managed with the same anesthetic protocol, except hypnotic drugs (sevoflurane or propofol). During double lung ventilation in decubitus lateral position patients were managed with volume-controlled ventilation, tidal volume 8 ml/kg, and PEEP 5 cmH2O. In one-lung ventilation (OLV) tidal volume was change to 6 ml/kg (ideal weight). Arterial blood was drawn for measurement of arterial CO2.
The gradient between arterial CO2 and end tidal CO2 (Grad CO2) measured by capnography was recorded. Then, patients were divided in two groups: Grad CO2 ≥ 10 mmHg and less than 10 mmHg. Fiberoptic bronchoalveolar lavage (BAL) was performed in both lungs before and after OLV for analysis of inflammatory markers (IL1, IL2, IL6, IL8, and TNF-a). The same inflammatory markers were analyzed in arterial blood at 3 time points: baseline (before OLV); 6 and 18 hours after surgery.
Postoperative hospital stay and postoperative pulmonary complications were also recorded. T-Student test was used to compare both groups. Statistical significance was set at P <0.05.
**Results and discussion:** 98 patients (56%) showed a Grad CO2 ≥ 10 and 77 (44%) less than 10 mmHg. 28.9 % of patients Grad CO2≥ 10 group showed pulmonary postoperative complications, and 18.7% in Grad CO2<10 group (p = 0.123). Postoperative hospital stay was higher in Grad CO2≥ 10 group than in Grad CO2<10 group (10.3 ± 2 vs 6.4 ± 2 days, p= 0.005).
**Conclusion(s):** A considerable increase in Gradient CO2 in decubitus lateral position before lung resection surgery is associated with an increase in the pulmonary and systemic inflammatory response.

## 07AP01-4

### Transient receptor potential vanilloid type 1 attenuates lung ischemia-reperfusion injury through activation of α7 nicotinic acetylcholine receptor in mice

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**Background and Goal of Study:** Cholinergic anti-inflammatory pathway is a mechanism that brain regulates inflammation through vagal efferent nerves and α7 nicotinic acetylcholine receptors (α7nAChR). Our studies indicated that activation of transient receptor potential vanilloid type 1 (TRPV1) channels expressed on vagal afferent sensory nerves decreased lung ischemia-reperfusion injury (LIRI) in rabbits and rats.
This study was designed to detect whether TRPV1 attenuated LIRI through α7nAChR anti-inflammatory pathway.
**Materials and methods:** Before 1h of lung ischemia and 2h of reperfusion, wild type (WT) mice or TRPV1 knock-out (KO) mice were pretreated with placebo (IR or IR-KO group), TRPV1 agonist capsaicin (Cap, Cap or Cap-KO group), TRPV1 antagonist capsazepine (Caz)+ Cap (Caz or Caz-KO group), methyllycaconitine (MLA, a α7nAChR-selective antagonist) + Cap (MCap or MCap-KO group), or PNU (a α7nAChR-selective agonist) + Caz (PCaz or PCaz-KO group), respectively.
Sham groups (S or S-KO) were pretreated with vehicles and ventilated for 3h. Blood and lung tissue were obtained for blood gas indexes, lung wet-to-dry (W/D) weight ratio, HE staining for pathologic score, and IL1β, IL6 and TNFα levels in lung tissue.
**Results and discussion:**
1. Cap pretreatment in Cap group resulted in decreased lung W/D ratio, pathologic score, alveolar-arterial oxygen gradient (A-aDO2), and IL1β, IL6 and TNFα ($p<0.05$ vs IR), while the reduction disappeared in Caz, Cap-KO and Caz-KO groups ($p>0.05$ vs IR or IR-KO). These data indicated activation of TRPV1 by Cap improved lung inflammation and lung injury, while Caz or TRPV1 KO abrogated this improvement in mice.
2. After treated with MLA, MCap group presented higher A-aDO2, pathologic score, and IL1β, IL6 and TNFα levels ($p<0.05$ vs Cap). For MCap-KO group, there was a rise in the levels of A-aDO2 and pathologic score ($p<0.05$ vs Cap-KO). PCaz group showed lower levels of A-aDO2, pathologic score, W/D ration and IL1β ($p<0.05$ vs Caz group). PCaz-KO group showed lower levels of A-aDO2, pathologic score, IL1β and IL6 ($p<0.05$ vs IR-KO). Thus, administration of α7nAChR antagonist abolished the protective effect of Cap, while agonist generated similar protection even in TRPV1 KO mice and WT mice treated with Caz.
**Conclusion:** Activation of TRPV1 attenuates LIRI probably through α7nAChR anti-inflammatory way. The specific role of cholinergic anti-inflammatory pathway in this protection remains to be revealed.

## 07AP01-5

### Degradation of endothelial glycocalyx and MicroRNAs modulation in a model of lung resection surgery. Effect of sevoflurane administration

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**Background and Goal of Study:** Consequent to lung resection surgery (LRS) there is an inflammatory response with endothelial damage and subsequent acute lung injury. The glycocalyx seems to have a key role in the regulation of endothelial permeability. In the other hand, modulation of MicroRNAs expression has been implicated in inflammatory processes[1], but it has not been studied in LRS. The protective effect of sevoflurane in LRS has been previously studied[2].
The aim of this study was to determine the degradation of glycocalyx and the expression pattern of MicroRNAs after LRS, and to evaluate the effect of sevoflurane on this response.
**Materials and methods:** A left caudal lobectomy was performed under general anesthesia and 120 min. of one lung ventilation (OLV) into two groups of 5 Mini-Pig breed pigs (Sevoflurane group-SEVO and Control group-CON). Anesthesia was maintained throughout the procedure with sevoflurane 3% in the SEVO or propofol (8 mg $kg^{-1}$ $h^{-1}$) in CON. After the procedure the animals were awaken, and 24 hours later were again anesthetized for extraction of biological samples. In the first procedure, a basal biopsy of left caudal lobe was performed. In the second one, biopsy of right mediastinal lobe (OLV during lobectomy) and left upper lobe (not ventilated during lobectomy) were performed. One additional procedure was performed in one group of five animals, with the same methodology as in the CON group but without lobectomy or OLV (Sham group). Lung tissue expression of Syndecan-1 and several MicroRNAs (MiR-182, 145, 146, 192 and let7d) were measured (Western blot and RT-PCR respectively). Lung edema was measured by gravimetric index. Differences between groups were analysed by ANOVA multiple range test, and Wilcoxon test for evolution of the intragroup values. $P<0,05$.
**Results and discussion:**

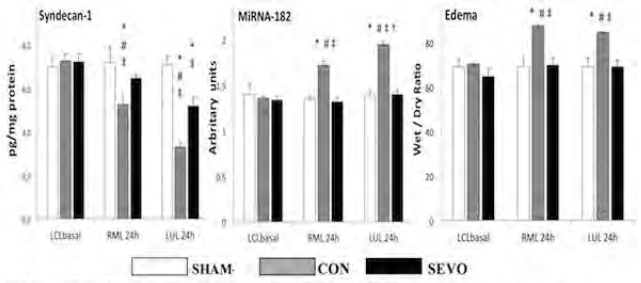


Table 1: *(LCL): Left caudal lobe. (RML): Right mediastinal lobe. (LUL) Left upper lobe.*
( * ) p<0,05 vs SHAM ( # ) p<0,05 vs SEVO ( ‡ ) p<0,05 vs Basal ( † ) p<0,05 vs RML 24h

*[Lung tissue]*

**Conclusions:** LRS promotes glycocalyx degradation and expression of MiRNA-182; this is linked to the development of lung edema. Sevoflurane administration during LRS protects from these molecular changes and the development of acute lung injury.
**References:**
1. *Oglesby IK, et al. Resp Res 2010; 11:148.*
*2. Rancan L et al. Transplantation 2014; 98:1151-1157*

## 07AP01-6

### Postoperative serum troponin I elevation after thoracotomy versus video-assisted thoracoscopic lung resection

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**Background and Goal of Study:** In high-risk patients undergoing lung resection, minimally invasive approach through video-assisted thoracoscopic surgery (VATS) is expanding and is associated with a lower incidence of major cardiopulmonary complications and mortality compared to open thoracotomy (1). Cardiac troponin-I (TnI) elevation is frequent after lung surgery (2), but its correlation with the surgical approach has not been described. The aims of this study were to determine the frequency of postoperative TnI elevation following thoracotomy or VATS lung resection in high-risk patients and its correlation with 30-day mortality.
**Materials and methods:** As part of routine postoperative care for all patients at high cardiac risk, we measured serum high-sensitivity TnI levels (Siemens ADVIA Centaur) during the first two postoperative days in 96 consecutive patients that underwent lobectomy (n=70) or lung wedge resection (n=26). High-risk patients were defined as ≥65 years or <65 years with known cardiovascular risk. Patients were divided in two groups depending upon surgical approach (open thoracotomy or VATS). The specific troponin cut off used was TnI ≥0.04 ng/ml. Baseline clinical characteristics, perioperative parameters, and 30-day mortality was assessed in both groups.
**Results and discussion:** Of the 96 patients screened, 44 were operated on through open thoracotomy (TH group) and 52 through VATS (VATS group). The overall frequency of TnI elevation was of 32.3%. TnI elevation was detected in 14/44 patients (31.8%) in the TH group and in 17/52 patients (32.7%) in the VATS group (P-value chi-squared 0.927). Baseline clinical characteristics and perioperative parameters were similar in both groups. Overall 30-day mortality was of 3/96 patients (3.1%). 30-day mortality was of 2/44 patients (4.5%) in the TH group and 1/52 patient (1.9%) in the VATS group (P-value chi-squared 0.825).

**Conclusions:** In high-risk patients undergoing lung resection, the frequency of postoperative troponin elevation was similar in patients operated on through open thoracotomy and through VATS. No differences were found in early mortality between both groups. The frequency of troponin elevation was higher than the one reported in non high-risk patients (3).

**References:**

1. Falcoz et al. Eur J Cardiothorac Surg. 2015;26 pii: ezv154
2. Lucrezioti et al. Rev Esp Cardiol. 2007; 60:1159-66
3. Deveraux RJ et al. JAMA. 2012; 307:2295-2304

## 07AP01-7

### Apneic oxygenation during one lung ventilation - a case report

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**Background:** Hypoxemia is a possible complication of one-lung ventilation (OLV), as shunt fraction increases, and oxygenation is impaired. There are some aspects that can predict this situation such as altered lung function and distribution of perfusion between the lungs, as well as intraoperative positioning. Hypoxemia during OLV may be prevented by applying a ventilation strategy that avoids alveolar collapse while minimally impairing perfusion of the dependent lung. When other causes are excluded such as misposition or obstruction of the double-lumen tube, treatment can be symptomatic by improving ventilator patterns, increasing inspired fraction of oxygen or using strategies to oxygenate the nonventilated lung.

**Case report:** We report a case of a 86 year-old female patient, with history of Diabetes Mellitus type II, hypertension, auricular fibrillation anticoagulated with Varfine® and recent pneumoniae in the right lung, without surgical or anesthetic history. The patient underwent an urgent thoracotomy to drain and remove clots from a spontaneous left hemothorax.

Intraoperatively, peripheral oxygen saturation was normal (98%) until the pulmonary exclusion was performed, after which hypoxemia ensued (83-87%), not responding to increase of the inspiratory oxygen fraction ($FiO_2$) and modification of the ventilator patterns. An open valve Waters system at 5L/min was then connected to the non-ventilated lung in order to oxygenate without actively ventilating it, with an increase of the oximetry to 95%, and without significant impairment of the operation field.

**Discussion:** Apneic oxygenation is a simple and efficient method for oxygen administration that can be used on OLV when other strategies such as increasing the FiO2 and positive end-expiratory pressure (PEEP), recruitment strategy and perfusion modulation have failed.

**Reference:**

Hypoxemia during one-lung ventilation: prediction, prevention, and treatment. Karzai W, et al. Anesthesiology, 2009. Apnoeic oxygenation on one-lung ventilation in functionally impaired patients during sleeve lobectomy. Sanchez-Lorente D, et al. Eur J Cardiothorac Surg, 2011.

**Learning points:** Apneic oxigenation constitues a simple and effective method to improve oxygen levels during one lung ventilation.

## 07AP01-8

### An evaluation of remifentanyl propofol response surfaces for predicting wake-up time during video-assisted thoracic surgery

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**Background and Goal of Study:** Practice of modern anesthesia usually employs a hypnotic and an analgesic to produce synergistically sedation and analgesia. Two response surface models of remifentanyl-propofol interaction previously developed from volunteers data were used to predict response to various degrees of sedation by using the Observer's Assessment of Alertness/Sedation (OAA/S) scores. One of the models predicts OAA/S<2 and the other does OAA/S<3.

Our hypothesis was that both of the models would accurately predict return of responsiveness after Video-Assisted Thoracic Surgery. Applying these models could reduce the total anesthesia time and then improve the efficiency of operating room.

**Materials and methods:** Thirty patients scheduled for Video-Assisted Thoracic Surgery were enrolled. General anesthesia was carried out with propofol infusion and fentanyl bolus. Effect site concentrations of patients were calculated by pharmacokinetic model from Schinider for propofol and Shafer for fentanyl throughout the procedure. Fentanyl effect-site concentrations were then converted to equivalent remifentanil effect-site concentrations using a relative potency of fentanyl to remifentanil of 1:1.2. All assessments of sedation were performed every twenty seconds by one investigator. Model predictions were compared with observed response to evaluate the accuracy and precision of model prediction of wake-up time in Video-Assisted Thoracic Surgery.

**Results and discussion:** The average difference between the time when a patient with response to name spoken in normal tone and the time when the model predicted 50% probability of a patient would respond were 30.80 ± 17.77 minutes (mean ± SD) for the OAA/S<2 model and 13.71 ± 11.35 minutes for the OAA/S<3 model.

**Conclusion(s):** Our results suggest that although the two models were possible to identify target concentration pairs that predicted the time of ROR in volunteers and some elective surgery, but in patients after VATS with double lumen intubation under TIVA with TEA, we may need another response surface model of epidural and IV anesthetics combination to predict the time of ROR.

## 07AP01-9

### Enhancing patient safety in robotic thoracic surgery with continuous real-time visualization via video double lumen tube

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**Background:** With the introduction of minimally invasive surgical techniques, the utilization of robotic surgery continues to rise. Providing good lung isolation and one lung ventilation can be challenging in robotic thoracic surgery; given the unique positioning of the patient and limited airway access.

**Case report:** 69 year old male with a lung tumor presented for robotic assisted left lower lobe lobectomy. Since the DaVinci robot's positioning will essentially cover the patient's head and completely block the anesthesiologist access for airway security, we therefore, utilized the Vivasight™ (ET View Ltd, Misgav, Israel) video double lumen tube (VDLT) with an embedded camera to facilitate both placement and verification of the final position of the VDLT to ensure lung isolation.

**Discussion:** Currently, placement of double lumen tubes (DLT) with fiberoptic bronchoscopy (FOB) confirmation is the standard of care in the United States. The positioning of the patient and robot, often make the airway inaccessible since the patient is in lateral position and the head may be turned 90-180 degrees away; making FOB challenging and awkward to perform. Technological advances in the miniaturization of video camera and light source offer a novel solution to the challenges faced by the anesthesiologist in these robotic cases. The view provided by the VDLT allows for continuous real time visualization of the primary carina, which facilitates rapid diagnosis and appropriate intervention; a critical factor in patients with low cardiopulmonary reserve in whom even transient disruption of ventilation may be detrimental. Using this

novel solution, the anesthesiologist can forewarn the surgical team when the tube may become malpositioned and not rely necessarily on desaturation, changes in airway pressures, or surgeon complaining of lung inflating in the surgical field. That may offer another measure of patient safety as the continuous visualization of the airway can reduce complications from adverse airway events. Although the VDLT can be used with or without the FOB, further study is warranted to evaluate issues such as cost and obstruction of camera lens by secretions.

**Reference:**
Koopman EM et al. Anaesthesia 2015Aug;70 (8):962-8.doi:10.1111/anae.13068. Epub2015 Apr 1

**Learning points:** Continuous visualization via VDLT offers: rapid diagnosis and forewarning of malposition, verification of corrective maneuvers without FOB use and enhances patient safety.

## 07AP01-10

### The length of right main bronchus in supine and lateral positions after left-sided double lumen intubation

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**Background and Goal of Study:** The length of right main bronchus is essential for proper placement of right sided double lumen tubes or right endobronchial blockers. Regarding the physical difference among population, we hypothesized that Thai people might have shorter right main bronchus compared to westerns. This study was conducted to measure the average length of right main bronchus in Thai patients in supine and lateral positions after the left-sided double lumen intubation.
**Materials and methods:** The research design was cross sectional. After approval from the institute ethical committee, the study was carried out in 50 consecutive surgical patients undergoing thoracic procedures. A left sided double lumen tube was inserted and its position was confirmed by a flexible fiberoptic bronchoscope. A length of right main bronchus was measured in supine and lateral decubitus positions. Data regarding the length of right main bronchus was expressed as mean ± sd. with 95% confidence interval. Appropriate statistical tests including unpaired or paired t-tests were used when appropriate at a statistically significant level of 0.05.
**Results and discussion:** Out of 50 patients, 27 were female. All were adults with the age of 57 ± 14 years old, weight 54.79 ± 10.34 kg, height 159.5 ± 7.34 cm, and BMI 21.83 ± 3.91 kg/m$^2$. The average length of the right main bronchus in the supine position was 1.72 ± 0.75 cm with the 95% CI of 1.5, 1.94. The mean lengths were 1.62±0.84 cm. and 1.83±0.64 cm in female and male respectively (p=0.34). Compared to the supine position, there was a statistically significant increase in length of the right main bronchus in the lateral decubitus position to 1.83 ± 0.83 cm (p=0.043, 95% CI of 1.64, 2.1 cm).
**Conclusion(s):** The result of this study provides information regarding the length of right main bronchus in both supine and lateral decubitus position in patients undergoing thoracic procedures. The information could help anesthesiologist to properly place right sided double lumen tube or endobronchial blocker, thereby, protecting the right upper lung against atelectasis or aspiration during the thoracic procedures.

**References:**
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## 07AP01-11

### Metalloproteinases after one-lung ventilation. Relationship with mechanical ventilation and postoperatory pulmonary complications in lung resection surgery

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**Background and Goal of Study:** Some studies have related an exacerbated lung inflammatory response to the development of acute lung injury (ALI) in lung resection surgery (LRS). The elevation of matrix metalloproteinases (MMP) in bronchoalveolar lavage (BAL) fluid has been related with acute lung injury during mechanical ventilation, and therefore it could affect the outcome of LRS.
The goal of the study was to evaluate the predictive value of MMP on postoperative pulmonary complications (PPC) in patients undergoing LRS.
**Materials and methods:** We designed a prospective study (a substudy of NCT 02168751), which was approved by the local Ethics Committee. Written informed consent was obtained from all patients scheduled for LRS. The exclusion criteria applied were as follows: treatment with immunosuppressant drugs within 3 months prior to surgery, blood products administration within 10 days before the surgery, relevant pulmonary disease (FEV1<50%). After intubation with a double-lumen tube, all patients were managed with volume-controlled ventilation (VCV), tidal volume (TV) 8 ml/kg, PEEP 5 cmH2O, FiO2 0.4-0.5 and respiratory rate to maintain end tidal CO2 30-35 mmHg. In one-lung ventilation (OLV), TV 6 ml/kg, PEEP 5 cmH20, permissive hypercapnia and FiO2 0.6-1 to maintain SatO2>90% were applied. Fiberoptic BAL was performed in both lungs before and after OLV for analysis of MMP. BAL samples were centrifuged and the supernatant was stored at -40 ºC until analysis. Expression of MMP was measured with Western Blot. We recorded the PPC defined as Ariscat criteria. For statistical analysis we used Mann Whitney U test.
**Results and discussion:** We have seen the relationship between high plateau pressure and driving pressure and low lung compliance with an increase in dependent lung MMP-9 BAL samples at the end of surgery. However, patients who developed PPC showed an increase in MMP-7 and MMP-9 in the non-dependent lung.
**Conclusion(s):** We conclude that the behavior of MMP in the BAL of patients undergoing LRS can play an important role in the postoperative course.

## 07AP01-12

### Nonintubated thoracoscopic surgery for lung tumors in patients with compromised lung function

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**Background and Goal of Study:** Patients with compromised lung function or chronic obstructive pulmonary disease are considered high-risk for intubated general anesthesia, which may preclude them from surgical treatment for lung tumors. We evaluated the feasibility and safety of nonintubated video-assisted thoracoscopic surgery (VATS) for the surgical management of lung tumors in patients with compromised lung function.
**Materials and methods:** From August 2009 to December 2014, 28 patients with compromised lung function (preoperative forced expiratory volume in 1 second <70% of predicted) underwent nonintubated VATS using a combination of thoracic epidural anesthesia or intercostal nerve block and intrathoracic vagal block with target-controlled sedation.
**Results and discussion:** Eighteen patients had primary lung cancers. In the patients with primary lung cancer, lobectomy was performed in 4, segmentectomy in 3, and wedge resection in 11, with lymph node sampling adequate for staging. One patient required conversion to intubated one-lung ventilation because of persistent wheezing and labored breathing. Five patients developed air leaks more than 5 days postoperatively. Two patients developed acute exacerbations of chronic obstructive pulmonary disease, and atrial fibrillation occurred in 1 patient. The median duration of hospital stay was 6 days. Nonintubated thoracoscopic surgery has the theoretical advantage of preserving natural negative-pressure breathing physiology. Additionally, avoiding endotracheal intubation reduces airway irritation and complications such as

a sore throat and hoarseness. For patients with diffuse emphysematous pathology, nonintubated technique minimizes the possibility of pneumothorax during mechanical ventilation.
**Conclusion(s):** Nonintubated VATS is technically feasible and safe. It may be applied as an alternative to intubated general anesthesia in managing lung tumors in selected patients with compromised lung function.
**References:**
1. Ceppa DP, Kosinski AS, Berry MF et al. Thoracoscopic lobectomy has increasing benefit in patients with poor pulmonary function: A society of thoracic surgeons database analysis. Ann Surg 2012;256(3):487-493.
2. Chen JS, Cheng YJ, Hung MH, et al. Nonintubated thoracoscopic lobectomy for lung cancer. Ann Surg 2011;254(6):1038-1043.
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## 07AP02-1

### Continuous monitoring of lactate using intravascular microdialysis in high-risk cardiac surgery

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**Background and Goal of Study:** Increased lactate levels after heart surgery are associated with postoperative morbidity and prolonged length of ICU stay. Continuous monitoring of lactate using intravascular microdialysis technique has the potential to improve the detection of hypoperfusion and reinforce decision-making in high-risk cardiac surgery. Thus, the aim of our study was to assess the accuracy and applicability of this system for continuous lactate monitoring in high-risk cardiac surgery.
**Materials and methods:** Twenty patients undergoing elective complex (repair or replacement of two or more valves) or combined (valve and coronary artery) cardiac surgery were enrolled into a prospective observational pilot study. In all patients continuous lactate monitoring was performed using a triple-lumen central venous catheter with an integrated intravascular microdialysis function (Eirus™ TLC catheter for Eirus™, Maquet Critical Care, Solna, Sweden). Lactate concentration was measured using intravascular microdialysis system ($Lactate_{cont}$) and compared to the lactate concentration in the arterial blood ($Lactate_{art}$) at 19 stages during the surgery and postoperatively.
**Results and discussion:** In total, 432 paired microdialysis-arterial blood gas lactate samples were obtained. After surgery, the concentration of lactate increased significantly peaking at 8hrs ($p<0.05$). The lactate clearance within 8hrs after peak concentration was 50 (39-63) %. There was a significant correlation between $Lactate_{cont}$ and $Lactate_{art}$ ($rho = 0.92$, $p<0.0001$). Bland-Altman analysis showed a bias (mean difference) ± limits of agreement (±1.96 SD) of 0.09 ± 1.1 mmol/L. In patients with postoperative complications, median and maximum lactate concentrations were significantly higher compared to the group without complications: 2.92 (1.75-3.50) mmol/L vs. 2.36 (1.50-3.00) mmol/L and 6.75 (4.43-7.75) mmol/L vs. 4.20 (3.95-4.87) mmol/L, respectively ($p = 0.002$).
**Conclusion(s):** Lactate concentration increases significantly after high-risk cardiac surgery. The intravascular microdialysis technique for lactate measurement provides acceptable accuracy and can be used for continuous blood lactate monitoring in open-heart surgery.

## 07AP02-2

### Intraoperative decrease of regional cerebral oxygen saturation is not associated with the occurrence of delirium after elective cardiac surgery

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**Background and Goal of Study:** Delirium after cardiac surgery is associated with increased morbidity and long-term mortality. Aging and low baseline cerebral oxygen saturation measured by near infrared spectroscopy ($rSO_2$) have been associated with the occurrence of postoperative delirium. In this prospective, observational study, our goal was to assess the association between duration and severity of intraoperative $rSO_2$ decrease and the occurrence of delirium after cardiac surgery.
**Materials and methods:** In patients over 65 years of age, without previous psychiatric, neurological, cerebrovascular or renal disease, $rSO_2$ was continuously monitored and recorded (INVOS 5100®), during elective cardiac surgery, after ethical committee approval. Medical information was obtained. "Intensive care delirium screening checklist" (ICDSC) was used to evaluate delirium in the ICU. Mann-Whitney, Student's T-test, chi-square, Fisher's test and binary logistic regression were used for statistical analysis. Quantitative results are presented as mean ± SD and median [IQR], as appropriate.
**Results and discussion:** Of 42 patients (74.3±5.8 years old, 50% female, 2% ASA II, 93% ASA III, 5% ASA IV, EuroSCORE II = 7±3.8%), 69% underwent open heart surgery; 31% underwent valve replacement, 31% aortocoronary bypass, 35.7% both, and 2.3% left atrial myxoma exeresis. Six patients (14.3%) presented delirium during ICU stay. They had less severe absolute ($AUC_{abs}$ 3 vs 158 min.%, p=0.04) and relative ($AUC_{20\%}$ 1 vs 72 min.%, p=0.01) $rSO_2$ decrease. They were not different regarding age (P=0.32), BMI (P=0.78), sex (P=1.00), ASA physical status (0 vs 2,7% ASA IV, P=1.00), EuroSCORE II (P=0.20), baseline rSO2 (p=0.55), frequency of open-heart surgery (P=0.65) or duration of surgery (P=0.35), but had higher preoperative C-reactive protein (5.9 [IQR 4.6, 7.2] vs 3.2 [IQR 1.1, 5.0] $mg.l^{-1}$, P=0.04) and creatinine (1,1 [IQR 0.9, 1.2] vs 0.8 [IQR 0.6, 0.9] $mg.dl^{-1}$, p=0.03) plasma levels. Preoperative creatinine level predicted ICU delirium occurrence (OR $1.34x10^3$ [95% CI 5.46 - $331x10^3$], P=0.01) in stepwise multivariate analysis.
**Conclusion(s):** Intraoperative cerebral oxygen saturation decrease was not associated with postoperative delirium occurrence. Preoperative creatinine plasma level was an independent predictor for delirium occurrence after elective cardiac surgery, although our results need to be confirmed in a properly sized sample of patients.

## 07AP02-3

### Erythropoietin for minimising perioperative allogeneic blood transfusion in open heart surgery: a systematic review

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**Background and Goal of Study:** Erythropoietin increases the ability of bone marrow to produce red blood cells. Elevation of preoperative haemoglobin concentration may be helpful in reducing low perioperative haemoglobin levels, thereby reducing the need for allogeneic red blood cell transfusion.
The objective of this study was to assess the efficacy and safety of preoperative erythropoietin in adults who underwent open heart surgery.
**Materials and methods:** The CENTRAL, MEDLINE, PubMed, EMBASE, ISI Web of Science databases were searched to identify all randomised controlled trials that investigated the effectiveness of preoperative erythropoietin in open heart surgery. The primary outcome was units of allogeneic blood cells transfusion. The secondary outcomes were the number of patients receiving allogeneic blood transfusion, change of haemoglobin levels, and adverse events, especially thromboembolic events and death, and cost of using erythropoietin.
**Results and discussion:** Data from seven trials enrolling 445 people are included in this review. Preoperative erythropoietin administration in cardiac surgery can reduce the number of patients receiving allogeneic blood transfusion (pooled risk ratio (RR) 0.36, 95% confidence interval (CI) 0.26-0.51, p <0.00001). Three studies with 328 people reported that the mortality

was higher in the control group (RR = 3.83, 95% CI 0.67-21.82, p = 0.13). Thromboembolic events were reported in four studies with a total of 353 people and the number of events was found lower in the erythropoietin group (RR = 0.91, 95% CI 0.58-1.42, p = 0.66). We did not perform a meta-analysis for the units of allogeneic blood transfusion and change of haemoglobin levels because statistical heterogeneity was identified in these outcomes. There was no information of complications of allogeneic blood transfusion and cost of using erythropoietin.
**Conclusions:** Preoperative erythropoietin administration reduces the number of patients receiving perioperative allogeneic blood transfusion in adult undergoing open heart surgery. There is no evidence that erythropoietin improves outcomes for volume of allogeneic blood transfusion, change of haemoglobin, mortality, and thromboembolic events.

## 07AP02-4

### Impact of acute normovolemic hemodilution using hydroxyl ethylstarch 130/0.4 on coagulation profiles during cardiac surgery

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**Background and Goal of Study:** Possible impact of acute normovolemic hemodilution (ANH) employing hydroxyethyl starch(HES) 130/0.4 on blood viscoelastic profile has not been well investigated.
**Materials and methods:** After getting approval from IRB(KUH1160060), patients undergoing cardiac surgery employing moderate hypothermic CPB were randomly applied into one of two groups:
Group-ANH (n=23) and
Group-C (n=23) before initiating CPB.
In Group-ANH, 5 ml/kg of blood salvage and administering 5 ml/kg of Volulyte was performed for ANH before CPB. In both groups, bloodless priming solution consisting of 1600-1800 ml balanced-crystalloid and albumin, hemofiltration before the weaning of CPB, intraoperative cell salvage and reinfusion of salvaged blood were performed. For the present study, viscoelastic profile in rotational thromboelastogrsphy (ROTEM) were determined before initiating ANH (T1), after the ANH (T2), and after CPB (T3). Other variables including hematocrit, Pao2/Fio2 and electrolytes were also determined. t-test/Mann-Whitney Rank Sum test(inter-group comparisons at T1 and T3) and paired t-test/Wilcoxon Signed Rank Test(comparisons T1 vs. T2) were performed as appropriate.
**Results and discussion:** Mean of hematocrit and median of FIBTEM-A10 were significantly reduced in Group-ANH (T1 vs. T2, $p<0.001$ and $p<0.05$, respectively), but other ROTEM profiles, the duration of CPB, electrolytes, and Pao2/Fio2 did not show inter-group difference. Amount of allogenic blood transfusion of also did not show inter-group difference during and after CPB.
**Conclusion(s):** ANH with balanced HES 130/0.4 did not affect intraoperative coagulation profile and amount of transfusion in cardiac surgery.
**Reference:**
J Cardiothorac Vasc Anesth 2003; 17: 747-54

| | Group | T1 | T2 | T3 |
|---|---|---|---|---|
| INTEM-CT (s) | Group-C | 227 ± 62 | NA | (245) |
| | Group-ANH | 208 ± 41 (218) | (208) | (237) |
| EXTEM-CT (s) | Group-C | 38.2 ± 4.2 | NA | 73 ± 26 |
| | Group-ANH | 55 ± 15 (52) | (62) | 86 ± 28 |
| EXTEM-MCF (mm) | Group-C | 60 ± 7 | NA | 49 ± 8 |
| | Group-ANH | 61 ± 6 | 59 ± 7 | 50 ± 8 |
| FIBTEM-A10 (mm) | Group-C | (11) | NA | (6) |
| | Group-ANH | (9) | (8)* | (4) |
| Hematocrit (%) | Group-C | 36.3 ± 4.7 | NA | 31.1 ± 2.5 |
| | Group-ANH | 38.7 ± 4.3 | 36.2 ± 3.9* | 30.6 ± 3.5 |
| Pao2/Fio2 ratio | Group-C | 399 ± 112 | NA | 360 ± 183 |
| | Group-ANH | 418 ± 141 | 368 ± 150 | 314 ± 127 |

Data are mean ± SD (median), mean ± SD or (median) as appropriate. NA: not applicable
*: p<0.05 vs. T1; †: p<0.05 in inter-group comparison
T1: before initiating ANH; T2: after completion of ANH; T3: after weaning from CPB

*[Table 1. Changes in ROTEM profiles, hematocrit and Pa)2/FiO2 ratio]*

| | Group | During CPB | After CPB |
|---|---|---|---|
| Duration (min) | Group-C | 51 ± 14 | NA |
| | Group-ANH | 48 ± 16 | NA |
| Packed RBC (unit) | Group-C | 0 (0-0) | 0 (0-0) |
| | Group-ANH | 0 (0-0) | 0 (0-0) |
| FFP (unit) | Group-C | 0 (0-0) | 0 (0-0) |
| | Group-ANH | 0 (0-0) | 0 (0-0) |
| Platelet (unit) | Group-C | 0 (0-0) | 0 (0-0) |
| | Group-ANH | 0 (0-0) | 0 (0-0) |
| Cryoprecipitate (unit) | Group-C | 0 (0-0) | 0 (0-0) |
| | Group-ANH | 0 (0-0) | 0 (0-0) |
| Urine output (ml/hour) | Group-C | 62 ± 44 | 47 ± 31 |
| | Group-ANH | 41 ± 14 | 37 ± 15 |

Data are mean ± SD (median), mean ± SD or (median) as appropriate. NA: not applicable
*: p<0.05 in inter-group comparison

*[Table 2. Transfusion during and after cardiopulmonary bypass]*

## 07AP02-5

### Thoracentesis improves physical and pulmonary function in patients with pleural effusion after open cardiac surgery - results from a randomised, clinical trial

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**Background and Goal of Study:** Pleural effusion (PLE) is a common complication after open cardiac surgery. Correlation between size of PLE and symptoms is poor, and treatment is largely at the discretion of the physician. Dedicated studies concerning the clinical impact of thoracentesis are lacking. The primary aim of present study was to determine the immediate effect of thoracentesis on walking distance and pulmonary function in an attempt to provide recommendations pertaining to treatment of postoperative PLEs.
**Materials and methods:** The study was a randomised, controlled intervention trial including 76 patients, ratio 1:1. Patients scheduled for elective on-pump coronary artery bypass grafting and/or aortic valve replacement were eligible for inclusion. Patients were randomised to either standard postoperative care, or three follow-up-visits with clinical examinations, focused chest sonography, and protocolled thoracentesis if applicable. Primary endpoints were changes in walking distance and peak expiratory flow after thoracentesis. Secondary endpoints were the difference between groups in walking distance, peak expiratory flow, and quality of life from baseline to final visit.
**Results and discussion:** A total of 65 patients concluded the per-protocol population, and 17 cases concluded the analyses for the primary endpoint. Mean drained volume was 888±416ml. Mean difference in walking distance before and after thoracentesis was 80.7±42.1m corresponding to a 51% improvement, *p<0.001*. Mean difference in peak expiratory flow before and after thoracentesis was 1.1±1.2 l/min corresponding to a 40% increase, *p<0.001.* The mean difference in walking distance after 30 days was 52.3±22.6m between groups, *p=0.024.* Quality of life, and peak expiratory flow showed no variation between groups when comparing change from baseline to final visit. Thus, the sustained improvement in walking distance cannot be explained by better pulmonary function. The restriction on physical capacity associated with PLEs are likely to be caused by more than respiratory distress.
**Conclusion(s):** Thoracentesis immediately improves walking distance and pulmonary function in patients with postoperative PLEs larger than 400ml. Focused chest sonography greatly aids the diagnosis of PLEs, supporting a shift towards routine chest sonography both during primary hospitalisation and in the month after cardiac surgery.

## 07AP02-6

### Multiplate use during an emergency neurosurgical procedure followed by coronary artery bypass grafting: what did we learn?

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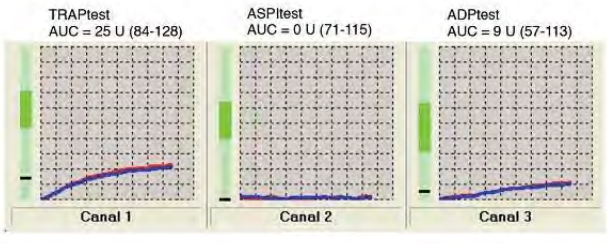
**Background:** Impedance platelet aggregometry is increasingly used to evaluate the bleeding and thrombotic risks in patients treated with antiplatelet drugs.
**Case report:** A 79 year-old man treated with antiplatelet drugs (aspirine plus clopidogrel) was admitted to our hospital for a NSTEMI. As the coronary angiography revealed a critical stenosis of the left main stem coronary artery, anticoagulation with unfractionated heparin was initiated and coronary artery bypass surgery was planned .The patient progressively developed tetraparesia, and the MRI showed a cervical epidural hematoma (C3 to D2) . We decided to perform an emergency hemilaminectomy, immediately followed by off-pump myocardial revascularization. Before the neurosurgical procedure started, platelet function was assessed with the Multiplate® analyser (Roche Diagnostics, Basel, Switzerland) and showed a high level of platelet inhibition: ASPItest 0 U (norm 71-115), ADPtest 9 U (norm 57-113) and TRAPtest 25 U (norm 84-128) (Figure 1).




*[Multiplate Analysis]*

Given the risk of left main coronary occlusion, we did not administer platelet concentrates preventively before the neurosurgery began. No excessive bleeding occurred during the laminectomy, and the heart surgery was then performed using a small dose of unfractionated heparin (100IU/kg). No abnormal bleeding was observed and platelet transfusion was not required.
**Discussion:** The Multiplate® analysis was in favour of marked platelet inhibition which under normal circumstances would probably have been treated by the transfusion of platelet concentrates. We decided to correct platelet inhibition only if clinically significant bleeding occurred.
**Reference:**
Managment of severe perioperative bleeding:guidelines from the European Society of Anesthesiology. Kozek-Langenecker. Eur J Anaesthesiol. 2013 Jun; 30(6): 270-382.doi
**Learning points:** Preventive platelet transfusion should be avoided.
Clinically significant bleeding should be the main criteria for implementing a platelet transfusion algorithm even if platelet function testing demonstrates a high level of platelet inhibition.

## 07AP02-7

### Iatrogenic left ventricular outlet obstruction with a ventricular septal defect occluder

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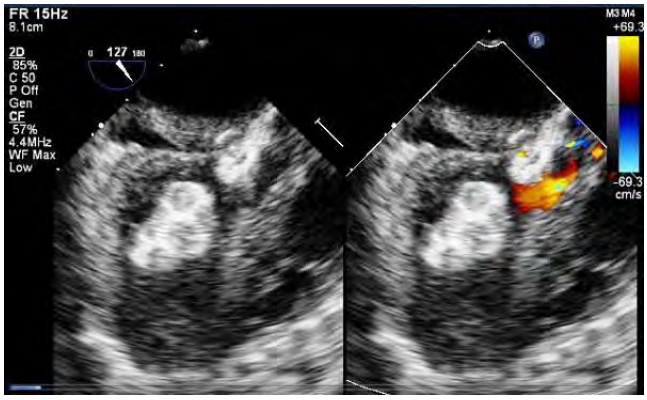
**Background:** Ventricular septal occluder placement may cause life-threatening complications. Our case represented an iatrogenic left ventricular outlet obstruction caused by the placement of a VSD occluder.
**Case report:** An 11-month-old full-term girl was diagnosed with a double outlet right ventricle during pregnancy and received total correction with VSD repair. Residual VSDs with right heart -volume overload and pulmonary hypertension were noted by cardiac echo. After receiving cardiac catheterization twice with VSD occluders following balloon atrial septostomy, heart failure with cyanosis was still existed. The patient was later transferred to our hospital for surgical treatment.
After admission, cardiac echo indicated 2 residual VSDs, a large muscular trabecular type and subaortic inlet type; each VSD had deployed 2 occluders in the previous hospital (fig).




*[Fig]*

Severe left ventricular outlet obstruction with severe aortic regurgitation caused by occluder deployment was noted (fig). The patients received cardiac surgery, including the re-do of 2 VSD patch repairs, atrial septal defect closure, occlude removals, and aortic valve and tricuspid valve plasty. The patient recovered following the surgery.
**Discussion:** Postoperative residual VSDs are extremely common. VSD occluders are considered safe for managing the condition and avoiding second surgery.
Several studies have reported life-threatening complications of VSD occluders. Our case presented an uncommon VSD-occluder complication involving left ventricular outlet tract obstruction.
To prevent the complication, echocardiogram monitoring, such as transesophageal echo (TEE), during the procedure may help in early detection of the malpositioned occluders.
**Reference:**
Ammash NM, Warmes CA. Ventricular septal defects in adults. Annals of Internal Medicine 2001; 135:812-4
**Learning points:**
1. Symptoms of heart failure may occur following the use of VSD occluders, and VSD occluder-related complications should be considered.
2. The TEE may aid clinicians determining hemodynamic status during the procedure.

## 07AP02-8

### Clinical impact of continuous dexmedetomidine based sedation in coronary artery bypass graft (CABG) surgery patients

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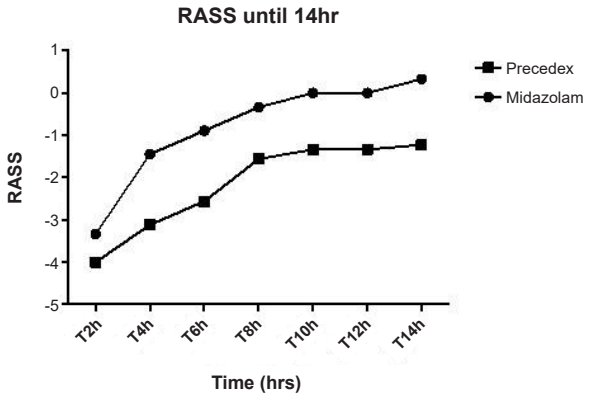
**Background and Goal of Study:** This prospective, randomized, open-label, controlled study was designed to compare dexmedetomidine-based to midazolam-based sedation after coronary artery bypass graft (CABG) surgery in the cardiac intensive care unit.
**Materials and methods:** After approval of IRB and written informed consent, forty patients scheduled for elective CABG surgery were randomly assigned to receive intravenous midazolam (0.03-0.1 mg/kg) or dexmedetomidine (0.7 μg/kg/hr).
The drug was administered from the time of sternal closure until weaning from mechanical ventilator. An infusion rate of dexmedetomidine or additional dose of midazolam was determined based on maintaining a RASS ≥ -2 (light sedation).
We recorded sedation score, time to extubation, ICU stay time, hemodynamics with cardiac index, and various side effect every 2 hours.
**Results and discussion:** The patient treated with dexmedetomidine showed significantly lower level of sedation than midazolam (P=0.008, Fig. 1). Average times to spontaneous respiration (865±181 min vs 884±272 min, P=0.862), to weaning from mechanical ventilator (1,020±95 vs 973±276 min, P=0.642), and to ICU staying (75±8 vs 69±8 day, P=0.177) were similar between midazolam and dexmedetomidine group, respectively. The hemodynamic variables (MAP, cardiac index, pulmonary artery pressure and etc.) and incidence of side-effects (delirium, shivering, nausea, vomiting, and pain) did not differ between the groups.
**Conclusion(s):** Sedation with dexmedetomidine 0.7 μg/ kg/hr i.v. provide effective sedation for post-CABG surgical patients, in particular, who need a deeper level of sedation. Nevertheless, patients who received sedation with dexmedetomidine did not show delayed recovery and any other side effects.
**References:**
1. Ji F, Li Z, Young N, Moore P, Liu H. Perioperative dexmedetomidine improves mortality in patients undergoing coronary artery bypass surgery. J Cardiothorac Vasc Anesth 2014; 28:267-73.
2. Herr DL, Sum-Ping ST, England M. ICU sedation after coronary artery bypass graft surgery: dexmedetomidine-based versus propofol-based sedation regimens. J Cardiothorac Vasc Anesth 2003;17:576-84.




*[The Changes of RASS in ICU]*

## 07AP02-9

### Incidence of VAP in cardiac surgery

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**Background:** VAP is linked with increased morbidity and mortality following cardiac surgery and is associated with significant financial burden. VAP is difficult to diagnose in this population. Most patients' post-cardiac surgery develop signs that overlap with VAP (e.g. elevated inflammatory markers, patchy infiltrates on chest x-ray) or cannot fully fulfil the clinical criteria (intubated <24 hours).
The aim of this study is to determine the incidence of VAP post-cardiac surgery in a tertiary referral centre and highlight the influence of this on the duration of intensive care length of stay.
**Materials and methods:** Demographic patient data, length of hospital stay and laboratory/ radiological findings were prospectively collected for patients undergoing cardiac surgery at John Raddcliff NHS Foundation Trust (Oxford, UK) between 01/10/2015 and 30/11/2015. Patients were classified as having VAP if they developed fever >38C and/ or <35C, (2) WBC >11x$10^9$/L and/or presence of alveolar infiltrates on chest x-ray. All patients had to be extubated in the first 24 hours. Patients who required emergency surgery were excluded. The diagnosis of VAP was based on blood/ sputum cultures and was subsequently confirmed by a microbiologist.
**Results and discussion:** Over the study period, 133 patients were admitted to the cardiothoracic critical care unit. Eighteen patients met the inclusion criteria for this study; the incidence of VAP was 13.5%. The median age was 66 years (range, 30-85). The median body mass index was 28 (range, 18-39). The average length of stay in cardiothoracic care unit for these patients was significantly longer (9.3 days) as opposed to those who did not develop VAP (3.5 days). Two patients died; both due to multi-organ failure (mortality; 11.1%). VAP preventative measures are practiced (head of bed elevation, HME use, close suctioning system, chlorhexidine oral rinse and minimising sedation).
**Conclusions:** Although the incidence of VAP in our population is in line with previously published, it is relatively high given that we actively practice VAP preventative measures (head of bed elevation, HME use, close suctioning system, chlorhexidine oral rinse and minimising sedation). We plan to introduce endotracheal tubes with sub-glottic suctioning in an attempt to decrease the incidence of VAP in the future.

## 07AP02-10

### Application of transesophageal echocardiography probe for guidance of internal jugular vein catheterization in patients undergoing cardiac surgery

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**Background and Goal of Study:** The present study was aimed to compare the TEE probe with the vascular probe in terms of the guiding the internal jugular vein catheterization in patients undergoing cardiac surgery, in order to provide new and safe methods for the guidance of internal jugular vein catheterization.
**Materials and methods:** 100 cardiac surgery patients who were scheduled to receive internal jugular vein catheterization was recruited, including 50 adult and 50 young children patients. The adult and children patients were both randomized assigned into two groups, the control group and the study group, respectively, with 25 patients in each group. patients in study groups received ultrasound guided right internal jugular vein catheterization with the TEE probe, and patients in control groups received ultrasound guided with the vascular probe. Time spent through placing the probe to the completion of vein punction was recorded as puncture time; first attempt success rate, the quality of the imaging (quantified with the scale scores; recorded as the image quality and needle tip positioning scale scores 0-4 with higher score indicating better quality and more accurate positioning; wire positioning and catheter positioning score ranges 0-2 with higher score indicating more accurate positioning.)was recorded. The incidence of complication was observed, including the carotid artery puncture, hematoma, pneumothorax, hemothorax, etc.
**Results and discussion:**
(1) Adult patients and Young children patients, 1) no significant difference was found in the age, gender proportion, height and weight between groups;

2) there was no statistical difference in the first attempt success rate, the puncture time, image quality, needle tip positioning, wire positioning, catheter positioning between these two groups (all the P value was greater than 0.05). (2) No complication or adverse event was observed.
**Conclusion(s):** In the performance of the internal jugular vein puncture and catheterization guided by the ultrasound in cardiac surgery patients, the TEE probe was comparable with the vascular probe in the time spent on the puncture, image quality, positioning, TEE can be used to guide the internal jugular vein puncture and catheterization in cardiac surgery patients with favourable feasibility and safety.

## 07AP02-11

### Effects of isoflurane increments on intraoperative left ventricular systolic long-axis performance during remifentanil-based isoflurane-supplemented anesthesia for cardiac surgery: a prospective observational study

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**Background and Goal of Study:** The direct impact of isoflurane on intraoperative left ventricular (LV) systolic performance during cardiac surgery has not been fully elucidated. Peak systolic tissue Doppler velocities of the lateral mitral annulus (S') has been used for evaluating LV systolic long-axis performance.
We hypothesized that incremental isoflurane dosage would dose-dependently reduce S' in cardiac surgery patients.
**Materials and methods:** After obtaining IRB approval (KUH1160052), we determined intraoperative S'values after 10min exposure to isoflurane 1.0,1.5, and 2.0 minimum alveolar concentration with a fixed remifentanil dose (1.0 μg/kg/min, T1, T2, and T3) by using transesophageal echocardiography In patients undergoing cardiac surgery during remifentanil-isoflurane anesthesia (n=20).
The primary outcome measure of this study was the changes in S' (mean of the first and second measurement of S') at T1, T2 and T3.
**Results and discussion:** Mean values (95% confidence interval, CI) of S' at T1, T2, and T3 were 10.5(8.8-12.2) cm/s, 9.5(8.3-10.8) cm/s and 8.4(7.3-9.5) cm/s respectively and significantly different (F(3, 17) =79.598, p <0.001: Wilk's lamda=0.066 in MANOVA test): their mean differences in T1 *vs*. T2, T2 *vs*. T3, and T1 *vs*. T3 were -0.96(95% CI -1.63−-0.32) cm/s, -2.09(95% CI -3.08−-1.09) cm/s and -1.11(95% CI -1.66 −-0.57) cm/s respectively. Between the first and the second measured values, correlation coefficient were 0.743 for S', 0.736 for e' and 0.630 for a'. There was no significant difference in BP, PAP, CVP, HR, and SvO2, as represented in the table below.

| | T1 | T2 | T3 | *p*-value |
|---|---|---|---|---|
| S' (cm/s) | 10.5 (8.8–12.2) | 9.5 (8.3–10.8)* | 8.4 (7.3–9.5)*† | <0.001 |
| e' (cm/s) | 12.3 (10.8–13.8) | 11.8 (10.5–13.1) | 11.0 (9.9–12.0) | 0.059 |
| a' (cm/s) | 10.6 (9.3–12.0) | 9.8 (8.5–11.0) | 8.7 (7.7–9.7)*† | <0.001 |
| E (cm/s) | 64.8 (55.4–74.2) | 67.1 (59.5–74.8) | 66.0 (58.8–73.1) | 0.660 |
| A (cm/s) | 46.0 (39.5–52.5) | 42.8 (35.5–50.2) | 41.8 (34.4–49.2) | 0.064 |
| DT (ms) | 197 (164–231) | 185 (153–218) | 173 (143–204)* | 0.007 |
| E/e' | 5.7 (4.5-6.9) | 6.2 (4.9-7.4) | 6.4 (5.2-7.5) | 0.765 |
| LVEF (%) | 62 (59-66) | 60 (57-62) | 58 (54-61)* | 0.008 |
| phenylephrine (μg/kg/min ) | 0.04 (0.03–0.05) | 0.07 (0.05–0.08)* | 0.10 (0.05–0.8)*† | <0.001 |
| CI (L/min/m²) | 2.4 (2.1–2.7) | 2.4 (2.1–2.7) | 2.5 (2.1–2.8) | 0.952 |
| SVRI (dynes ·s/cm⁵/m²) | 1396 (1162-1631) | 1345 (1095-1596) | 1293 (1048-1539) | 0.182 |
| BIS | 43 (41-45) | 37 (35-40)* | 35 (32-38)* | <0.001 |

Values are expressed as means (95% confidence interval).
*: $p < 0.05$ vs. T1; †: $P < 0.05$ vs. T2.

*[Table. Changes in echocardiographic measurements and calculated indices, and hemodynamic parameters during the isoflurane dosage increments]*

**Conclusion(s):** Administering isoflurane appears to dose-dependently reduce S' indicating LV systolic long-axis performance in patients undergoing cardiac surgery. Further studies may be required to evaluate the clinical relevancy of these findings.
**References:**
J Am Soc Echocardiogr 2003;16:424-31
J Am Soc Echocardiogr 1998;11:442-9.

## 07AP02-12

### Integrated pulmonary Index reflects changes in hemodynamics and respiratory function after off-pump coronary artery bypass grafting

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**Background and Goal of Study:** The Integrated Pulmonary Index (IPI) algorithm utilizes the real-time measures and interactions of four parameters (end-tidal CO2, respiratory rate, pulse rate, and SpO2) to provide an early warning about respiratory status. The IPI is displayed as a single index from one to ten, where 10 indicates a normal respiratory status, and requires validation in different settings. The aim of the study was to assess the ability of IPI to detect changes in hemodynamics and respiratory function after off-pump coronary artery bypass grafting (OPCAB).
**Materials and methods:** Forty adult patients aged 62 (56-68) yrs. after elective OPCAB were enrolled into a prospective study. During early postoperative period, all the patients were monitored with ECG, invasive arterial pressure, cardiac index (CI) and blood gases while all the components of IPI were registered with portable oximeter/capnograph (Capnostream 20, Covidien). The respiratory support after surgery was discontinued according to the weaning protocol. Data are presented as median ($25^{th}$-$75^{th}$ percentiles) and analyzed using Mann-Whitney U-test. For correlation analysis, we used Spearman's test.
**Results and discussion:** Compared to patients with IPI = 10, the value of IPI<10 after ICU admission was associated with decreased heart rate: 56 (54-61) bpm vs. 75 (61-80) bpm, (p=0.003), EtCO2: 28 (28-30) mm Hg vs. 33 (32-35) mm Hg, (p<0.001), and CI: 2.32 (1.93-2.60) L/min/m2 vs. 2.6 (2.36-3.00) L/min/m2 (p=0.037). The value of IPI after tracheal extubation correlated with IPI at 6, 12 and 18 hrs of spontaneous breathing (*rho* = 0.44, *rho* = 0.6 and *rho* = 0.49, respectively, p <0.01). The $PaO_2/FiO_2$ ratio correlated with IPI values at 2, 6, 12 and 18 hrs of the postextubation period
(*rho* = 0.49, *rho* = 0,53, *rho* = 0.57 and *rho* = 0.68, respectively, p<0.01), but not during mechanical ventilation.
**Conclusion(s):** The integrated pulmonary index (IPI) reflects changes in hemodynamics and respiratory function after OPCAB and may be a valuable adjunct to the bundle of monitoring, especially during postextubation period.

## 07AP03-1

### Red blood cell transfusion is associated with long-term mortality in esophageal cancer patients undergoing esophagectomy

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**Background:** Red blood cell (RBC) transfusion has been known to increase a morbidity and mortality in several surgical patients. The effects of RBC transfusion on outcomes after esophagectomy have rarely been evaluated. We investigated the impacts of RBC transfusion during perioperative period on long-term mortality in a large number of esophageal cancer patients who underwent esophagectomy.
**Materials and methods:** This study evaluated 589 esophageal cancer patients undergoing esophagectomy. Intraoperative and postoperative RBC transfusions were collected. The associations between RBC transfusion and long-term mortality were evaluated using multivariable analysis with Cox proportional hazards models.
**Results and discussion:** Of the 589 patients, 186 patients (31.6%) received RBC transfusion during perioperative period. Death occurred in 109 (27.0 %) patients in who received RBC transfusion and 99 (53.2 %) patients in who did not. After adjusting the confounders, there was an incremental association between RBC transfusion and long-term mortality (hazard ratio 2.36, 95% confidence interval 1.75-3.18, P <0.001).
**Conclusions:** Perioperative RBC transfusion is associated with long-term mortality in esophageal cancer patients who underwent esophagectomy, although a small number of RBC unit is tansfused.

## 07AP03-2

### Exuberant subcutaneous emphysema after thoracoscopic surgery - a case report

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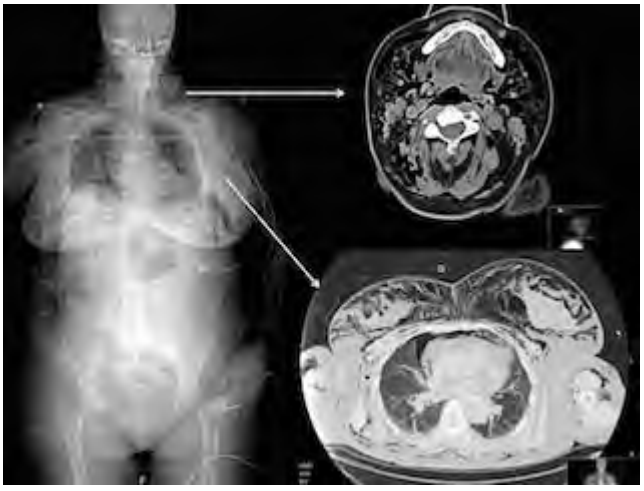
**Background:** Subcutaneous emphysema (SE) is usually self-limited, but a potentially fatal condition. Thoracoscopic procedures that are technically difficult and manipulation of the airway, both increase the risk of postoperative SE[1].
**Case report:** A 62-year-old female, Behçet disease, proposed for elective right thoracoscopic cervico-thoracic sympathectomy due to post-traumatic right arm chronic pain and oedema.
Uneventful selective intubation with a left double lumen 37 Fr endotracheal tube was performed and correct positioning was confirmed by fibroscopy.
Surgical procedure was laborious and prolonged due to several pleural adhesions and difficult pulmonary deflation. At the end of the surgery chest X-ray was normal and patient was safely extubated.
Discharge from post-anaesthetic care unit occurred 2 hours after the end of surgery. Six hours later, was admitted in the emergency room for exuberant SE, hoarseness and dyspnoea. Right chest drain was inserted.
CT scan: SE from eyelids to lumbar flanks, mostly cervical (with extrinsic airway compression) and thoracic (extensive SE and mediastinal emphysema). No visible tracheal leak (image 1).



*[Head to pelvis CT scan]*

Bronchoscopy: tracheal haemorrhagic suffusions without visible leaks, main bronchi reduced diameter due to external compression.
Patient was maintained in spontaneous ventilation with high flow $O_2$ and carefully monitored in intensive care unit. Four days after was transferred to surgery ward and at eigth postoperative day was discharged, without complains.
**Discussion:** Postoperative SE may be related to lung injuries, since the procedure was technically difficult. Nevertheless, small airway injury could not be excluded. Behçet disease may be associated to pleural adhesions and a more friable tracheal mucosa.
Patients with severe facial and cervical SE should be carefully monitored for airway obstruction. Surgical airway can be compromised. High flow $O_2$ contribute to a faster SE absorption and should be used.
**Reference:**
1. InteractCardiovTh 2014;18:825-9
**Learning points:** Discuss risk factors, differential diagnosis, airway management, monitoring and treatment of severe postoperative SE.

## 07AP03-3

### Anesthetic management using extracorporeal circulation support of a patient with a great lung mass complicated by cardiac tamponade

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**Background:** Extracorporeal circulation (ECC) is primarily used for open heart surgery, however there are also other medical and surgical conditions in which could be useful. ECC is occasionally used to ensure adequate oxygenation and hemodynamic stabilityduring thoracic, brain, liver or kidney surgeries[1].
**Case report:** A 68 year old male patient was admitted to the Emergency Department of our institution with dyspnea and cough associated with chest pain and hemodynamic instability. Chest X-ray and CT shows mediastinal shift toward the left side due to a large mass in right hemithorax associated with pleural and pericardial effusion. Surgery is scheduled for removal of the mass. When the patient arrived at the operative theater left radial artery and right internal jugular vein was cannulated, subsequently, and after administration of heparin (300 IU/kg) and measurement of the activated clotting time, femoral vessels were cannulated under local anesthesia. The venous cannula was placed in the right atrium and the arterial cannula in the iliac artery. Then extracorporeal circulation was initiated, anesthesia was induced and the patient intubated. Thoracotomy was performed finding a tumor of 40 cm x 30 cm, with important neovascularization. The tumor is fixed to the mediastinum, pericardium, pleura and diaphragm, also presenting pleural and pericardial effusion. Complete resection of the tumor was performed.
The patient had a torpid postoperative course. At present, on day 55 postoperatively, the patient continues in the hospital recovering from his injuries.
**Discussion:** In the current literature there are some reported cases of establishment of ECC before anesthetic induction. We chose to initiate extracorporeal circulation in awake patient to minimize the risk of complications associated with induction of anesthesia and mechanical ventilation in a patient hemodynamically compromised by tumor compression of the right cavities and pericardial effusion.
**References:**
1. Kawahito, S., Kitahata, H., Kitagawa, T., Oshita, S., Nose, Y. Non-cardiac surgery applications of extracorporeal circulation.*J Med Invest*. 2007;54:200-210.
**Learning points:** With the use of ECC, difficult and complex surgeries can be performed more safely and some seriously ill patients may benefit from establishing extracorporeal circulation under local anesthesia prior to anesthetic induction. It is important that the surgeon, anesthesiologist, and perfusionist are trained in applications of ECC.

## 07AP03-4

### Sevoflurane decreases systemic inflammatory response in lung resection surgery and one lung ventilation in an animal experimental model

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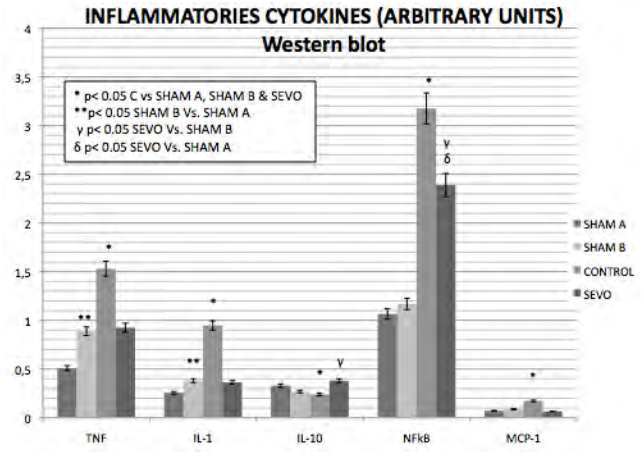
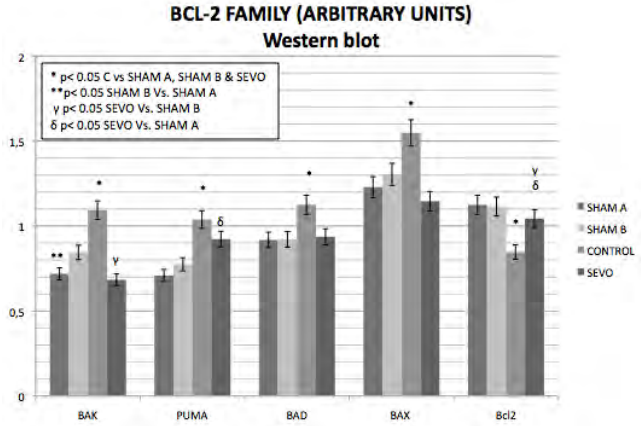
**Background and Goal of Study:** Lung Resection surgery (LRS) with One Lung Ventilation (OLV) is associated with an intense local and systemic inflammatory response (SIR)[1]. The aim of this work was to study the effects of the administration of inhalated sevoflurane on the SIR during LRS with OLV[2].
**Materials and methods:** Twenty swine were divided en 4 groups, 5 animals each. Ten animals underwent to left caudal lobectomy: Group CONTROL (CON) received propofol (8-10 mg kg -1 h -1) and Group SEVOFLURANE (SEVO). Two additional procedures were perfomed in two groups with the same methodology as in the CON group but without lobectomy nor OLV (SHAM-A), and without lobectomy but with OLV (SHAM-B). After the procedure the animales were awaken and 24 h. later were again anesthetized. Liver samples determination of TNF-alpha, IL-1, IL-10, MCP-1, NFkB, BCL-2, BAK, PUMA, BAD and BAX were measured at 24 h.. Monitoring included parametres derived of PiCCO system (cardiac output, extravascular lung water, global end diastolic volume and sistolic volume variation).

Differences between groups were analysed by ANOVA multiple range test and Wilcoxon test for evolution of the intragroup values. P values <0.05 were considered.

**Results and discussion:**




*[Liver biopsies: cytokines]*




*[Liver biopsies: bcl-2 family]*

**Conclusion:** OLV can by itself promote a SIR after LRS. Sevoflurane use has demonstrated to attenuate inflammatory and pro-apoptotic response in the liver secondary to lung resection surgery and increase the antiinflammatory response, IL-10 and anti-apoptotic protein bcl-2.

**References:**

1. Schilling T et al. The pulmonary immune effects of mechanical ventilation in patients undergoing thoracic surgery. Anesth Analg 2005;101:957-65.
2. Potočnik I et al. Antiinflammatory effect of sevoflurane in open lung surgery with one-lung ventilation. Croat Med J. 2014 Dec;55(6):628-37.

## 07AP03-5

### Hypoxia during one lung ventilation

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**Background and Goal of Study:** The technique of one lung ventilation (OLV) is instituted with the purpose to achieve isolation of the diseased lung being operated upon, using double-lumen endobronchial tube. Thoracic surgical procedures which are performed in lateral decubital position nowadays couldn't be imagined without OLV. In spite advantages regarding surgical exposure, OLV is associated with serious respiratory impairment. Hypoxemia is considered to be the most important challenge during OLV. The goal of this study was to establish the magnitude of intrapulmonal shunt, as well as the immensity of hypoxia during general anesthesia with OLV.

**Materials and methods:** In this prospective interventional clinical study thirty patients were enrolled who underwent elective thoracic surgery with prolonged period of OLV. The patients received balanced general anesthesia with fentanyl/propofol/rocuronium. A double-lumen endobronchial tube was inserted in all patients, and mechanical ventilation with 50% oxygen in air was used during the entire study. Arterial blood gases were recorded in a lateral decubital position with two-lung ventilation, at the beginning of OLV (OLV 0) and 10 and 30 min. (OLV 10, OLV 30, respectively) after initiating OLV in all patients. The monitoring was standard. Arterial oxygenation (PaO2), arterial oxygen saturation (SaO2) and venous admixture percentage - intrapulmonal shunt (Qs/Qt %) were measured, as well as mean arterial pressure and heart rate during the same time intervals.

For the purpose of this study, the quantitative value of Qs/Qt% was mathematically calculated by the blood gas analyzer AVL Compact 3. A p value <0.05 was taken to be statistically significant.

**Results and discussion:** When OLV was instituted arterial oxygenation decreased, whereas Qs/Qt% increased, about 10 min. of the commencement, with improving of the oxygenation approximately half an hour afterwards. Statistically relevant difference (p<0, 05) occurred regarding PaO2, SaO2 and Qs/Qt in the different measurings.

**Conclusion(s):** Hypoxia during OLV with increase of Qs/Qt usually occurs after 10 min. of its initiation. Following 30 min. of the beginning of OLV, the values of the Qs/Qt regularly decrease back to the normal quantities.

## 07AP03-6

### Manual positive pressure jet ventilation in a patient with an acute obstruction of the trachea treated with rigid bronchoscopy and laser

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**Background:** Urgent anesthesia of patients with severe sublgotic obstruction is a challenge in the approaching of the airway management (1). In the present clinical case, we were able to get optimal conditions for ventilation, diagnose and treatment of the patient with an extreme dyspnea.

**Case report:** The patient, a 61 years-old man was diagnosed a subglottic tumor at the third-fourth cartilaginous rings. The sudden deterioration of the health of the patient with extreme dyspnea prompted the surgical emergency. Anesthesiologist and thoracic surgeon decided to remove the tumor in the trachea by rigid bronchoscopy and manual jet ventilation. The induction to anesthesia was performed after invasive motorization of the arterial pressure, peripheral venous cannulation and oxygenated applying CPAP around 10 cm of water with face mask ventilation. Afterwards general anesthesia was inducted plus curarization with succinylcholina. TIVA was administered controlling the hypnotic depth by bispectral index(BIS).

With optimal respiratory and hemodynamic conditions rigid bronchoscope was introduced, using ventilation with manual jet with 2-4 atm and respiratory rate between- 4-6 breaths/min, monitoring $C0_2$ and looking after respiratory movements, synchronizing the ventilation with the surgery. Tissue was recovered for analysis and the tumor mass was removed totally, with almost a complete recovery of the tracheal space.

**Discussion:** No incidences were reported during the surgery and post-anaesthesia. Keeping spontaneous breath during the general anaesthesia was ruled out because of the depression of the respiratory impulse. The level of obstruction in the trachea did not allow performing a tracheostomy. Extracorporeal oxygenation was ruled out as requires anti-coagulation and risk associated. The positive pressure in the inside of the trachea allowed to avoid its collapse, facilitating ventilation and exhale with long exhales.

**Reference:**

Uma B et al. Anesthetic management for bronchoscopy and debulking of obstructing intratracheal tumor. *Saudi Journal of Anaesthesia*. 2015;9(4):484-488

**Learning points:** The present clinical case shows the viability of the use of positive pressure ventilation in an obstructive problem in the trachea. The use of jet ventilation facilitates the surgery in anatomical reduced spaces such as the trachea. In this protocol it is of paramount importance to monitor the respiratory movements to guarantee the exhalation and avoid a barotrauma.

## 07AP03-7

### Relationship between the time of day lung transplantation is performed during 24-hours shifts and short-term survival

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**Background and Goal of Study:** After-hours medical care has previously been associated with worse outcomes in different fields of medicine (1, 2). Nevertheless, many organ transplantations do occur at nighttime when elective cases have been concluded. This approach, however, does not seem to affect outcome after kidney transplantation (3). Data for double lung transplantation (DLTX) when performed during 24-hour shifts are currently lacking. In this study we tried to evaluate the effect of the time of day patients were transplanted within the scope of this particular working schedule on 90-day survival.
**Materials and methods:** We conducted a retrospective cohort study investigating data from our institutional lung transplant database that comprised the time frame from January 2009 through July 2015. Stratification was done by skin incision time (i.e. daytime: 7 AM-7 PM; nighttime: 7 PM-7 AM). Our primary end point was short-term survival, assessed by the Kaplan-Meier method at 90 days. We employed multivariate Cox proportional hazard regression to examine mortality and unpaired t-test to evaluate differences between groups. A P-value $<0.05$ was considered significant.
**Results and discussion:** A total of 719 patients had been transplanted during the study period. 366 (51%) underwent DLTX during daytime and 353 (49%) during nighttime. The two groups were identical in regard of the underlying lung disease and co-morbidities. 90-day survival rate for patients having been transplanted during nighttime was 90% vs. 92% for transplant recipients who have been operated during daytime (hazard ratio: 0.75; 95% confidence interval: 0.46 - 1.21; P = 0.24). Median duration of anaesthesia during nighttime was 382 [Q1: 334; Q3: 444] min vs. 384 [340; 430] min during daytime (P = 0.9).
**Conclusion:** The timing of lung transplant did not have a significant effect on 90-day survival in the cohort of transplant recipients we investigated where potential confounders were evenly distributed between the two groups.These results confirm a registry study (4), which was conducted without knowledge about the organisation of working time at the participating institutions.
**References:**
1. Ricci WM et al. J Bone Joint Surg Am 2009; 91(9):2067-72
2. Glaser R et al. JACC Cardiovasc Interv 2008;1:681-8
3. Kienzl-Wagner K et al. Transpl Int 2013;26:879-85
4. George TJ et al. *JAMA* 2011;305:2193-99

## 07AP03-8

### Lung isolation with VivaSight DL double-lumen tube in patients with Mounier-Khun syndrome

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**Background:** Mounier-Kuhn syndrome (MKS) or congenital tracheobronchomegaly is a rare and chronic airway disease that presents a dilatation of the main airways and associated loss of elastic fibers in the trachea and main bronchus. These patients usually present respiratory symptoms, different degrees of recurrent infections, hemoptysis and dyspnea1. MKS causes difficulties related to the peroperative airway management due to the large and weak tracheobronchial structure, inefficient cough mechanism, tracheal diverticula, endotracheal tube dislodgement and possible postoperative tracheal collapse2.
**Case report:** a non-smoker 59 year-old man who had a history of tracheobronchomegaly, bronchiectasis, chronic obstructive pulmonary disease, dyslipidemia, angina pectoris and mild cognitive impairment was scheduled for elective thoracic surgery to a pulmonary lesion resection in the right lower lobe . The highest diameter of the trachea and main left bronchus diameter measured by chest CT was 41 mm and 29 mm, respectively . The trachea was intubated with a 37Fr VivaSight DL double-lumen tube guided by the embedded camera. Then we inflated the tracheal cuff and bronchial cuff with the usual volume of air, and after that we checked it with auscultation and capnography but both of these were inadequate and a progressive increase of the tracheal cuff volume (total cuff volume was 18 and 10 ml, respectively) were necessary, until the air leak ceased, avoiding to exceed the pressure of 25 cmH2O . After surgery the patient was extubated without complications and transferred to the ICU where he remained during 24 hours.
**Discussion:** Peroperative airway management in MKS is complicated due to the large and weak airway structures. Endotracheal tube and/or endobronchial tube cuff-leakage can be an usual and important problem during surgery, especially with respect to airway management during thoracic surgery.
**References:**
1. Krustins E, Kravale Z, Buls A. Respiratory Medicine. 2013; 107 (12): 1822-8.
2. Kim MY, Kim EJ, Min BW, Ban JS, Lee SK, Lee JH. Korean J Anesthesiol, 2010. 58(2): 197-201.
**Learning points:** Taking into consideration the larger diameter of the patient's trachea and the main bronchi, we used a 37Fr despite being aware of leakage risk and the need of using a high cuff volume. We knew also that there was a risk of cuff rupture during the lateral position that it's associated with a special difficulty to change this DLT.

## 07AP03-9

### Atrial fibrillation prophylaxis and esophageal resection - our experience

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**Background and Goal of Study:** Atrial fibrillation (FA) is a common complication in major thoracic surgery including esophageal resection. Recent guidelines suggest pharmacological prophylaxis of FA in thoracic surgery. The goal of this study is to find out is there a difference in FA incidence before and after introducing diltiazem FA prophylaxis.
**Materials and methods:** For this study we collected data (age, sex, comorbidity, FA prophylaxis, incidence of FA, the highest observed ventricular answer in FA, ASA status) for patients before the introducing the diltiazem prophylaxis and after it. Only patients with radical esophageal resection are included in the study. We got three groups of patients: one with no prophylaxis, one with diltiazem prophylaxis and one with perioperative continued preoperative antiarrhythmic therapy (beta blocker, amiodarone). The collected data were analyzed.
**Results and discussion:** There were 82 esophageal resections conducted in our Clinics for thoracic surgery "Jordanovac", University Hospital Centre Zagreb, between November 2012 and May 2015. Postoperative FA is counted in 11 cases (13,41%). 23 patient received diltiazem FA prophylaxis, 16 patients continued their preoperative beta-antagonist therapy, one patients continued preoperative amiodarone therapy and 42 patients did not receive any FA prophylaxis. Among the patients with postoperative FA, 4 patients were from the group received no FA prophylaxis, 4 patients were form the group received beta blockers, and 3 patients received diltiazem as FA prophylaxis. If we correlate patients with prophylaxis with diltiazem and patients with no FA prophylaxis, we get no significant difference (The Chi-square statistic is 0.1916. The P value is 0.661598. This result is not significant at $p < 0.05$).The highest noticed ventricular answer to FA was 140/min (110-140, median 130) in patients with diltiazem prophylaxis and 180/min (130-180, median 159) with no prophylaxis.
**Conclusion(s):** It seems that the diltiazem prophylaxis does not protect from FA, but we can speculate that it could make FA less deleterious by slowing the ventricular rhythm. To determine the significance of these findings further studies and bigger sample are needed.
**Reference:**
Frendel G et al. 2014 AATS guidelines for the prevention and management of perioperative atrial fibrillation and flutter for thoracic surgery procedures. The J Thorac Cardiovasc Surg. 2014;148.3:153-19

## 07AP03-10

### Epidural anesthesia in a video-assisted thoracoscopic surgery (VATS) on an awake pneumonectomized patient: a case report

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**Background:** The future of the thoracic surgery should be associated with a combination of surgical and anaesthetic evolution looking for improvements to reduce the trauma to the patient. For these reasons we present this case where minimally invasive surgery was combined with the use of regional anesthesia.
**Case report:** A 53 years old man, ASA III, ARISCAT 60 and Goldman II who was undergoing VATS for left pleural effussion drainage and lower lobe biopsy. Medical history of interest: right pleuro-pneumonectomy in 2008 due to malignant pleural mesothelioma with posterior radio/chemotherapy.
Given the impossibility of carrying out selective right lung ventilation we decided to realize an awake anesthesia with an epidural blockade at $T_5$-$T_6$ level together with a continuous Dexmedetomidine infusion of 1 mcg/kg/h to maintan a BIS between 60 and 80. To achieve the desired analgesic level 3 bolus of a combination of Lidocaine 2% + Levobupivacaine 0.125% were administer: 8, 4 and 2 ml. The surgery lasted 1 hour. Hemodynamic stability was maintained during all the surgery (mean BP 110/71 mmHg and HR 75 bpm). The patient was oxygenation 0.28 $FiO_2$ and $SpO_2$ > 97% was maintaned during all the process.
No incidents were reported during the surgery. After surgery, the epidural catheter was removed and the patient was transferred to the PACU for 12h.
**Discussion:** The present case shows an anesthetic alternative which can be used in special cases where selective ventilation is not allowed. We emphasize that this strategy may avoided the potential adverse effects related to general anaesthesia and selective ventilation, such as residual neuromuscular blockade postoperative nausea and vomiting and ventilation-induced lung injury. Finally, we accentuate treatment with dexmedetomidine to maintain a minimally and adequate sedation avoiding the adverse effects related to stress.
**Reference:**
Gonzalez-Rivas D, Bonome C, Fieira E et al. Non-intubated video-assisted thoracoscopic lung resections: the future of thoracic surgery? Eur J Cardiothorac Surg 2015.
**Learning points:** This anesthetic management might add a further step on the fast track surgery and become an indispensable and fully reliable tool within thoracic surgery.

## 07AP03-11

### Anaesthetizing a patient with a secreting thoracic paraganglioma: a roller coaster of emotions!

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**Background:** There should be a high index of suspicion in patients presenting with posterior mediastinum lesions, as secreting paragangliomas can behave like pheocromocytomas and lead to important perioperative challenges.
**Case report:** 45-year-old, female patient presenting to the ER with chest pain radiating to the back, paraesthesia of the right upper arm, a history of anxiety and ill-studied arterial hypertension. A thoracic CT-scan showed a solid lesion near the right pulmonary apex, with concomitant destruction of the vertebral bodies of T1-T2 and invasion of the intervertebral foramina.
A subsequent MRI confirmed an apparently extrapulmonary lesion invading T1-T3 with an intracanalar component, and the patient was admitted to the hospital for further study. 16 days later she underwent laminectomy of T1-T2-T3, rhizotomy of T2 and biopsy of the lesion, without excision due to its friable nature and repeated haemodynamic instability associated with tumoral mass mobilization. Pathology evidenced an aorto-sympathetic paraganglioma of the posterior mediastinum, and she was proposed for subsequent tumour embolization, occurring 2 months later.
The procedure had to be cut short due to hypertension and the patient was admitted to the ICU. Urinary metanephrines were then dosed, revealing increased normetanephrine levels.
She was started on alfa-blockers and, 3 days later, a beta-blocker was added, attaining haemodynamic stability. 8 days later the patient went for repeat embolization after which she was transported for the OR. Here vascular efferents and afferents were initially clipped and an *en bloc* excision performed through a right intercostal approach with intraoperative lung exclusion. During initial tumour manipulation esmolol had to be started due to adrenergic manifestations, quickly followed by hypotension with the need to start an adrenaline perfusion once the tumour was isolated from the circulation. Postoperative course was uneventful.
**Discussion:** This patient had already presented haemodynamic instability during tumour manipulation in the first surgery, as well as during the first embolization, but only after these were urinary metanephrines dosed and appropriate optimization started. These are fundamental steps to allow for a better intraoperative stability.
**Learning points:** Preoperative stabilization and anticipation of intraoperative problems with a low threshold for action are instrumental for a good outcome in these patients.

## 07AP03-12

### Analysis of the inflammatory biomarkers between continuous epidural infusion of ropivacaine 0,2% combined with fentanil versus epidural morphine for pain relief after thoracotomy: a prospective randomized study

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**Background and Goal of Study:** Epidural anesthesia can decrease the postoperative neuroendocrine stress response that surgical response evokes. Therefore, pain management may influence the immune response in the perioperative period. The goal of our study was to analyze how continous epidural infusion of ropivacaine combined with fentanil versus epidural morphine affects postoperative immune response in patients undergoing lung resection surgery after thoracotomy.
**Materials and methods:** After ethical committee approval, written consent were obtained. In this prospective and analytical study 60 patients scheduled for lung resection under thoracotomy were randomly assigned to two groups. Group 1(G1) received a continous epidural infusion of ropivacaine 0.2%+fentanil 4mcg/ml at 6ml/hour. Group 2(G2) received epidural administration of 4mg/12 hours morphine bolus. Inflammatory factors (TNF-alfa, interleukin [IL]-1,-6 and -8, norepinephrine, epinephrine, ACTH, growth hormone, prolactin, cortisol) were analysed. Blood multiple analyses were performed at different times: baseline, after surgical incision, at the end and 24 hours after surgery. The primary endpoint consisted to compare levels of inflammatory markers in G1 versus G2. Secondary endpoints evaluated were nausea and vomiting, pruritus, postoperative analgesic efficacy, patients satisfaction and postoperative complications.
**Results and discussion:** Patient characteristics were similar between groups. In both groups, postoperative inflammatory factors values differed significantly in comparison to the preoperative values. Concentration of IL-1, cortisol and ACTH increased in group G1 after surgical incision when compared to G2 ($p<0.05$). Levels of ACTH were increased at the end of surgery in G1 ($p<0.05$). Levels of IL-6 and ACTH were significantly increased 24 hours after the surgery in G1 versus G2 ($p <0.05$). There were no significant differences between groups in levels of TNF-alfa, norepinephrine, epinephrine, growth hormone and prolactin. Incidence of pruritus was higher in patients who received epidural morphine ($p<0.05$). There were no differences in the rest of secondary endpoints evaluated.
**Conclusion(s):** The stress response was not completely suppressed during surgery by epidural anesthesia. Patients who received epidural administration of morphine attenuate stress-induced cytokine production in comparison to patients who received continuous epidural infusion of ropivacaine 0,2% combined with fentanil.

## 07AP04-1

### Retrospective analysis of comparison between intraoperative infusion of dexmedetomidine and Propofol for postoperative delirium in elderly cardiac surgery on cardiopulmonary bypass

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**Background and Goal of Study:** To determine whether using dexmedetomidine intraoperatively is associated with fewer postoperative delirium (POD) in elderly cardiac surgery on cardiopulmonary bypass (CPB).
**Materials and methods:** Thirty-four eligible elderly patients (> 70-years-old) who underwent elective cardiac surgery on CPB between December 2014 and October 2015 were randomly divided prospectively into two group. Patients received either intraoperative infusion of dexmedetomidine (DEX group; 0.4-0.6 $\mu$g/kg/hr, n=17) or propofol (PRO group; 3-5 mg/kg/hr, n=17) and carotid ultrasound scanning were performed preoperatively in both group. Intraoperative cerebral oxygenation was assessed by the tissue oxygenation index (TOI) using near-infrared spectroscopy (NIRS). The absolute value of the difference (mean value of right TOI during CPB minus mean value of left TOI during CPB) (R-L mD) were calculated in both group. Delirium was assessed with the Confusion Assessment Method (CAM) for ICU.
**Results and discussion:** Patients suffered from a carotid stenosis (CS) in 8 (47.1%) and 3 (17.6%) cases in DEX and PRO groups, respectively. There was no difference in the incidence of POD between the DEX group (8 of 17 patients, 47.06%) and the PRO groups (5 of 17 patients, 29.41%) (P > 0.05). However, POD was present in 4 of 8 (50%) and 0 of 3 (0%) patients in DEX and PRO groups, respectively. Moreover, increased “R-L mD” values in PRO group were significantly associated with POD (P = 0.035).
**Conclusion(s):** This study suggests that intraoperative infusion of DEX is not associated with significantly lower rates of POD in elderly cardiac surgery on CPB. Instead, using DEX intraoperatively correlated significantly with POD in elderly patients who suffered from a CS.
**References:**
1. Djaiani G1, Silverton N, Fedorko L, Carroll J, Styra R, Rao V, Katznelson R. Dexmedetomidine versus Propofol Sedation Reduces Delirium after Cardiac Surgery: A Randomized Controlled Trial. Anesthesiology. 2015 Nov 16.
2. Park JB, Bang SH, Chee HK, Kim JS, Lee SA, Shin JK. Efficacy and safety of dexmedetomidine for postoperative delirium in adult cardiac surgery on cardiopulmonary bypass. Korean J Thorac Cardiovasc Surg. 2014 Jun;47(3):249-54.
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## 07AP04-2

### Percutaneous superior vena cava catheter related thrombosis for cardiovascular surgery with cardiopulmonary bypass

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**Background and Goal of Study:** For minimal invasive cardiovascular surgery, the insertion of percutaneous superior vena cava (SVC) catheter for cardiovascular surgery with cardiopulmonary bypass (CPB) has been increased. The larger diameter of it is thought to more catheter-related thrombosis, compared with conventional central venous catheter (CVC). We evaluated the incidence of percutaneous SVC catheter-related thrombosis and identified risk factors for developing the condition in patients undergoing cardiovascular surgery with CPB.
**Materials and methods:** A percutaneous SVC catheter was inserted into the right internal jugular vein (RIJV) in cardiovascular procedure with CPB. The RIJV was evaluated using ultrasonography including cross-sectional area (CSA), velocity, and echogenic mass size at the following times: just before insertion of the percutaneous SVC catheter (T1), and 24 (T2) and 48 h (T3) after its insertion.
**Results and discussion:** The incidence of thrombosis in the RIJV was 56.2%. The maximal cross-sectional lengths of the echogenic masses at T2 and T3 were 9.0±4.7 cm and 8.8±4.3 cm, respectively, and did not show a significant difference between T2 and T3. RIJV CSA decreased at T2, vs. T1 (1.63±0.58 $cm^2$ vs. 1.70±0.54 $cm^2$). However, RIJV velocity increased at T2 vs. T1 (27.3±8.7 cm/s vs. 25.8±9.9 cm/s). Multiple logistic regression analysis identified age (OR = 1.065, 95% CI = 1.028-1.103, *P* <0.001), percutaneous SVC catheter duration (OR = 1.015, 95% CI = 1.008-1.023, *P* <0.001), and transfusion amount of platelet concentrate (PC; OR = 1.145, 95% = CI 1.031-1.273, *P* = 0.012) as risk factors for percutaneous SVC catheter-related thrombosis in the RIJV.
**Conclusion:** The incidence of percutaneous SVC catheter-related thrombosis was higher than conventional CVC-related thrombosis, known as literatures. Risk factors were age, percutaneous SVC catheter duration, and transfusion amount of PC.

## 07AP04-3

### Coronary artery bypass graft (CABG) surgery in elderly patients older than 80 years old: 20 years of experience

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**Backgroung:** As increasing the age of patients undergoing cardiac surgery, the identification of main postoperative complications of this population and the evaluation of institutional outcomes is essential. We aim to describe our experience in CABG in elderly patients older than 80 years old comparing intraoperative and postoperative outcomes with younger population.
**Method:** From January 2003 to June 2013, 3097 patients underwent consecutive emergency and scheduled CABG surgery. 1770 underwent on-pump CABG and 1327 off-pump CABG according to surgeon’s criteria. Patients undergoing on-pump receiving other concomitant procedure and re-operations were excluded. Patients older than 80 years old were identified.
**Results:** We identified 98 patients older than 80 years old (80-group) (mean age 82±3.5 y.o) and 2957 younger than 80 y.o.(control group) (mean age 64.2±9.7 y.o.). Logistic Euroscore was 8.4±4.8 and 4.6±4.6 (p<0.001) in 80-group vs control group respectively and there was a higher incidence of female sex( 28.6% vs 18.6%) and hypertension (75.4% vs 62.3%) in the 80-group. Off-pump CABG was performed in 79.6% vs 41.6% (p<0.001) in the 80-group vs control group respectively. The average of grafts performed was lower in the 80-group, 2.7 ± 0.8 vs 3.2 ± 1.0 (*p*<0.001). However, the anterior descent artery was revascularized in 98% vs 97.5% (p=0.6) with arterial grafts in 92.9% vs 94.3%(p=0.5) respectively in both groups. There was a significantly higher 30d-mortality in the 80-group, 11.2% vs. 3.3%, respectively (*p*<0.001). ICU and hospital length of stay (LOS) were not significantly different 3.6 ± 2.2 days vs 4.4±12.1 d (*p*=0.5) and 9.0±10.0 days vs. 6.8±10.8 d (*p*=0.8) respectively. Patients in the 80-group underwent reintervention for bleeding, 9.2% vs 2.9% (p=0.001) and had more frequently cardiovascular complications (atrial fibrillation and cardiogenic shock) 22.4% vs 10.9%(p=0.002) than control group. Neurological, respiratory and renal complications were more frequent in the control group 2.0% vs. 3.1% (*p*=0.55), 9.2 % vs. 11.7% (*p*=0.4), 5.1% vs. 6.1% (*p*=0.6).
**Discussion:** CABG is performed preferably in patients older than 80 years old under off-pump procedure.The mortality is higher in this group on patients based on a higher incidence of haemodynamic complications and reintervention for bleeding in the immediate postoperative period. Specific measures to prevent and treat those adverse events could help to improve outcomes.

## 07AP04-5

### Ferric carboximaltose administration in cardiac surgery patients as iron deficiency treatment

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**Introduction:** Cardiac surgery patients present high anaemia prevalence, which is multifactorial[1]. Nonetheless, iron deficiency becomes one of the main causes during the immediate postoperative care, being it treatable[2].
**Objectives:** The aim of this study is to describe in a retrospective way the response to treatment with carboxymaltose in cardiac surgery patients who presented during the immediate postoperative setting iron deficit (transferrin saturation index under 20%) and they had normal preoperative baseline hemoglobin; according to the current hospital's iron deficiency protocol.
**Materials and methods:** This is a case series of thirteen patients who underwent cardiac surgery at our Hospital (H. La Fe de Valencia) during the months of September, October and November 2015, and that had been treated with ferric carboxymaltose in the postoperative setting. All thirteen patients presented transferrine saturation indexes less than 20% after surgery and therefore were administered carboximaltose (single dose 1 gr EV). Data was collected by reviewing their clinical records.
**Results:** The mean (presurgical) basal haemoglobin in these patients was 13,4 g/dL. 63% of patients had a haemoglobin over 10 g/dL at the moment of their hospital discharge and only three of them required red blood cell concentrates transfusion despite having been administered ferric carboximaltose. Two of the patients who met the criteria for inclusion died while being in the Ciritical care Unit due to other causes than anaemia.
**Conclusion(s):** Carboximaltose treatment after cardiac surgery in patients who have developed iron deficiency parameters seems to be adequate to reduce transfusion requirements; however it needs further studies to demonstrate the association.
**References:**
1. Yanes Vidal G. Practical management of preoperative optimization and perioperative treatment of anemia in different settings, anemia in patients for cardiac surgery. Revista española de Anestesiologia y Reanimacion, 2015; 62 (supl 1): 69-75.
2. Faraoni D, et al. World J Cardiol 2015 july26; 7(7): 377-382

## 07AP04-6

### Is it equally precise for the surgeon to measure the diameter of the aortic annulus as it is for the anesthesiology trainees during European TEE Certification?

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**Background and Objective:** Direct intraoperative sizing is the gold standard for aortic annular measurement in aortic valve replacement, but surgeons prefer to know previously which valvular size should be implanted. Echocardiography remains the main diagnostic tool. We planned to know whether we were successful in our measurements during training.
**Materials and methods:** Seventy-five patients with aortic valve stenosis were included in this observational study during European Certification in 2013 and 2014. TEE 2D were recorded by two trainees. They measured the preoperative aortic annulus (AoA) diameter once, but not in the same patient. TEE 2D in mid esophageal position was employed using an aortic long axis plane to get the best acquisition, in end-systole. Intraoperative sizing was taken by a surgeon working in the blind, using a standard gauge in the arrested heart and then choosing the valvular size. Pearson correlation was applied as statistical analysis.
**Results and discussion:** All patients had a mean age of 69,75±10,8 yrs, 47 men (62,7%), mean Aortic Gradient 46,8±14,7 mmHg, Left Ventricular Ejection Fraction 61,45±11,2 %. A mechanical valve was used as a replacement in 23 patients (30,8%) and bioprosthesis in 52 patients (69,3%). Mean TEE AoA diameter was 22,93±2,56 mm and mean surgical AoA diameter was 20,57±1,83 mm. Both diameters had a positive Pearson correlation (r=0,485, p>0,05). The population was divided into several subgroups. In the male group (r=0,635, p<0,01) was obtained, in the female group (r= -0,059). The group was separated into two age ranges, between 45 and 64 yrs (N=13, r=0,829, p<0,01), and > 64 yrs (N=59, r= 0,483, p<0,01). It was also divided according to two periods of time, before July 2014 (N=41, r=0,594, p<0,01) and after July 2014 (N=34, r=0,635, p<0,01). There are no studies in which TEE measurements have been made by trainees, however, there have been several done by experienced echocardiographers. Previous studies have found similar TEE 2D AoA diameter measurements and Pearson's correlation between TEE 2D AoA diameter and surgical measurements. We have better correlation in men, age range and in the six months after July. We measured women group poorly, probably because of a smaller AoA diameter.
**Conclusion:** Our results suggest trainees could be accurate of in measuring AoA in patients with aortic stenosis disease. Better precision is obtained in men than in women and also in the last training period.

## 07AP04-7

### Benchmarking the prognostic performance of EUROSCORE II with the original EuroSCORE in cardiac surgery patients

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**Background and Goal of Study:** The European System for Cardiac Operative Risk Evaluation (EuroSCORE) is one of the most documented preoperative risk algorithms for assessing operative morbidity and mortality following cardiac surgery, which has been recently refined to EuroSCORE II, in order to improve the performance of the original EuroSCORE. Aim of this study was to comparably assess the applicability of the updated EuroSCORE II model with the logistic (log) and additive (add) versions of the initial EuroSCORE, in cardiac surgical population, on the basis of morbidity and mortality.
**Materials and methods:** Data from a total of 1058 consecutive patients (aged 63.9 ± 9.1 years, male to female ratio: 3.7/1) admitted to our post-cardiac surgery intensive care unit (ICU) following cardiosurgical procedure, were included in this data analysis study. EuroSCORE add, EuroSCORE log and EuroSCORE II were calculated for each participant. The study endpoints were operative mortality (30-day) and morbidity assessed by length of intensive care unit stay (ICU-LOS), using 2-days as cut-off point. For statistical purposes Mann-Whitney test and ROC curve analysis were used.
**Results and discussion:** Overall ICU mortality of the study population was 3.3% (n=35). Univariate analysis revealed a significant augmentation (p=0.000) of the studied parameters in patients with ICU-LOS > 2 days and in those with poor outcome. In terms of ICU-LOS, ROC curve analysis showed that the area under ROC curve (AUR-ROC) for EuroSCORE add was 0.687 (cut-off 5), for EuroSCORE log was 0.695 (cut-off 4.45) and for EuroSCORE II was 0.720 (cut-off 1.76). In terms of operative mortality the AUR-ROC for EuroSCORE add was 0.818 (cut-off 7), for EuroSCORE log was 0.827 (cut-off 3.67) and for EuroSCORE II was 0.843 (cut-off 3.44).
**Conclusion(s):** The findings of the present study substantiate that EuroScore log, EuroSCORE add and EuroSCORE II models, confer noteworthy prognostic value when applied to adult cardiac surgical population, being more pronounced in terms of mortality. The updated EuroSCORE II risk model seems to confer superior discriminatory performance compared to the original EuroSCORE. Thus, the implementation of EuroSCORE II in cardiac ICU could possibly contribute towards risk stratification, mortality prediction and identification of patients who are at increased risk for prolonged ICU stay.
**Reference:**
Nashef SA, et al. Eur J Cardiothorac Surg. 2012;41(4):734-44

## 07AP04-8

### Usefulness of neutrophil-lymphocyte ratio to predict mortality and new-onset atrial fibrillation after cardiac surgery

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**Background and Goal of Study:** Neutrophils and lymphocytes play a role in the inflammatory processes of chronic diseases including atherosclerosis. Preoperative Neutrophil-Lymphocyte Ratio (NLR) has been found as an independent predictor of atrial fibrillation (AF) and cardiovascular mortality[1,2] We hypothesized that the preoperative and peak postoperative NLR would predict in-hospital mortality and new-onset AF after cardiac surgery.
**Materials and methods:** This is a sub-analysis of an ongoing prospective study including patients undergoing cardiac surgery with or without cardiopulmonary bypass (NCT02006212).Data are expressed in median (P25-P75). A Mann-Whitney test was used to compare groups. A binary logistic regression analysis was used to predict mortality or AF.
**Results and discussion:** Overall 620 patients were analyzed. 99 patients showed preoperative AF. There were 125(24%) new-onset AF cases among the remaining 521 subjects. In-hospital mortality occurred in 21(3%) patients. Tables 1 and 2 show the patients' characteristics.

| | AF (N=125) | No AF (N=396) | P |
|---|---|---|---|
| **EuroSCORE II; %** | 1,77 (1,12-2,95) | 1,35 (0,85-2,73) | 0,009 |
| **Preoperative NLR** | 2,75 (2,06-4,05) | 2,64 (2,09-3,78) | 0,79 |
| **Peak postoperative NLR** | 13,62 (9,77-18,44) | 14,12 (10,79-19,30) | 0,18 |
| **Age; years** | 70 (63-77) | 64 (54-73) | <0,001 |
| **Cardiopulmonary bypass time; minutes** | 101 (76-130) | 107 (75-144) | 0,21 |
| **Cross-clamp time; minutes** | 72 (56-97) | 79 (52-108) | 0,53 |
| **Length of stay in hospital; days** | 10 (8-14) | 7 (7-10) | <0,001 |

*[Characteristics of patients with or without AF]*

| | Mortality (N=21) | No mortality (N=599) | P |
|---|---|---|---|
| **EuroSCORE II; %** | 5,11 (1,72-9,27) | 1,7 (0,96-3,14) | 0,001 |
| **Preoperative NLR** | 3,20 (2,54-6,86) | 2,71 (2,08-4,01) | 0,06 |
| **Peak postoperative NLR** | 17,79 (9,81-26,18) | 14,30(10,63-19,47) | 0,40 |
| **Age; years** | 70 (63-82) | 68 (58-76) | 0,046 |
| **Cardiopulmonary bypass time; minutes** | 103 (85-130) | 105 (75-138) | 0,87 |
| **Cross-clamp time; minutes** | 74 (54-101) | 76 (52-105) | 0,95 |
| **Length of stay in hospital; days** | 17 (7-30) | 8 (7-11) | 0,01 |

*[Characteristics of patients with or without in-hos]*

Hosmer and Lemeshow test was valid. Age was the only independent predictor of new-onset AF. Peak postoperative NLR predicted mortality with an odds ratio of 1,033 (95% CI:1,002 - 1,065); P = 0,04. EuroSCORE II was a significant predictor of mortality as well.
**Conclusion(s):** This is the first prospective study evaluating the value of NLR in predicting mortality and AF in patients undergoing various types of cardiac surgery. Our preliminary results show that peak postoperative NLR might be useful in predicting mortality. Advanced age but not NLR predicts new-onset AF.
**Reference:**
1. Am J Cardiol 2010;105;2.Am Heart J 2007;154

## 07AP04-9

### Predictors and outcomes of hyperoxia in patients undergoing on-pump cardiac surgery

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**Background and Goal of Study:** The extent and effects of hyperoxia in cardiac surgery has been an on-going subject of interest and research. Potential benefits include myocardial pre-conditioning and reduced re-perfusion injury, lower incidence and longevity of gas microembolism although clinical benefits of those remain unclear. There is also a long list of possible detrimental effects including the formation of reactive oxygen species, reduced cardiac output, increased vascular resistance and reduced capillary density and tissue perfusion.
We aimed to identify patient and operative factors that could explain the variation in the degree of hyperoxia and assess its effects on postoperative outcomes.
**Materials and methods:** We have carried out an observational analysis of an institutional research database. Ethics approval was obtained for the study. Patient groups were defined based on intra-operative arterial blood gas analysis data - significant hyperoxia group (SHO, $PaO_2$ >300 mmHg), moderate hyperoxia (MHO, $PaO_2$ 200-300 mmHg) and normoxia (NO, $PaO_2$ <200mHg). Data was analysed using SPSS v23 statistical package. Independent samples T-tests were used to compare the results amongst individual groups.
**Results and discussion:** 259 consecutive CPB cases were included in the analysis. Standard CPB protocol resulted in mean $PaO_2$ of 263.9 ±73 mmHg with variation from 76.6 mmHg to 505.8 mmHg. Three patient factors had a significant correlation with the degree of hyperoxia: body mass index (BMI) ($p < 0.001$), gender ($p = 0.001$) and EuroScore ($p = 0.004$). Other patient or operative factors had no effect on intraoperative $pO_2$ levels. The incidence of postoperative infectious complications was 7.3% in SHO group, 3.5% in MHO and 2.7% in NO group ($p = 0.004$). Mean duration of mechanical ventilation was 26.48 h in SHO group, compared to 8.6 and 6.6 hours in MHO and NO groups respectively ($p = 0.04$). Postoperative ICU and hospital length of stay was significantly longer in SHO group ($p = 0.02$).
**Conclusions:** Standardised cardio-pulmonary bypass settings result in a wide variation in the extent of hyperoxia amongst the subjects. Risk factors for significant hyperoxia include low BMI, female gender and higher EuroScore. Intraoperative hyperoxia was associated with higher incidence of infectious complications and prolonged ICU and hospital stay.

## 07AP04-10

### Preoperative airway obstruction as a cause of morbidity in patients undergoing mitral valve replacement

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**Background and Goal of Study:** Although patients undergo similar surgical procedures and are monitored in the same unit, the duration of intensive care unit (ICU) and hospital stay may vary due to concomitant diseases.
We aimed to investigate the relationship between preoperative pulmonary function tests detected by obstruction of the airway and postoperative intubation time with prolonged ICU stay in patients undergoing mitral valve replacement.
**Materials and methods:** Following the Ethics Committee approval 62 consecutive patients undergoing mitral valve replacement between January 2011 and December 2014 were included in the study. All patients' gender, presence of systemic disease, smoking history, pulmonary function tests, ejection fraction, pulmonary artery pressure, perioperative cardiopulmonary bypass and aortic clamp time, postoperative intubation time, length of stay in ICU, preoperative and postoperative aspartate aminotransferase, alanine aminotransferase, serum urea nitrogen, creatinine, arterial blood gas values were recorded. The relationship between these parameters and ICU stay and the duration of tracheal intubation were evaluated. We aimed to investigate the affecting factors for prolonged ICU and hospital stay.
**Results and discussion:** Total of 62 patients, 36 were female and 26 were male. In 17 of the patients a history of smoking was detected. In 47 patients

systemic concomitant diseases were diagnosed. Nine of them had asthma, 8 had chronic obstructive pulmonary disease. Length of stay in ICU was significantly lower in patients with respirotary disease under treatment than the patients without respirotary disease ($p<0.05$). Chronic Obstructive Pulmonary Disease patients stayed significantly shorter than non-Chronic Obstructive Pulmonary Disease patients ($p<0.05$). The length of stay in ICU as also significantly shorter in patients who are under respiratory medication ($p<0.05$, Table 1). Significantly positive correlation existed between intensive care staying time and post-operative renal function indicators ($p<0.05$). Significantly negative correlation existed between intubation period and forced expiratory volume in the first second ($p<0.05$, Table 2).
**Conclusion:** Patients who underwent mitral valve replacement with cardiopulmonary bypass, preoperative airway obstruction assessments may provide postoperative decreased mechanical ventilation requirement and decreased hospital stay.

## 07AP04-11

### Risk factors for postoperative cognitive dysfunction following heart surgery in an Asian population

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**Background:** Post-operative cognitive dysfunction (POCD) is a significant sequelae of cardiac surgery, with affected patients exhibiting a decline in cognitive domains such as memory, concentration and language comprehension. Most POCD studies have been undertaken in a largely Caucasian population, whereas risk factors and pattern of brain injury in Asians may differ[1]. Hence, this study aimed to elucidate risk factors for POCD following cardiac surgery in an Asian population.
**Materials and methods:** 78 patients scheduled for elective CABG surgery in a national hospital in Singapore were recruited between February 2009 and December 2012. Patients received either miniaturised CPB (MCPB) or conventional cardiopulmonary bypass (CCPB). The repeated battery of neuropsychological status (RBANS) was used to diagnose POCD. Data analysis was done using SPSS Statistics Version 23. Potential risk factors were analysed using univariate analysis, those with p-value <0.1 were then entered into a multivariate analysis model.
**Results and discussion:** 78 patients were recruited initially; 3 passed away prior to follow up and 4 were lost to follow up, leaving 71 patients' data for analysis. The incidence of POCD was 51% (n=36). POCD rates did not vary significantly between MCPB and CCPB groups.
Following univariate analysis, factors significantly associated with POCD included: education level, diabetes, anaemia, ethnicity, lowest haematocrit during CPB, TNF-a 12 hours post-CPB, CRP and IL-6 48 hours post-CPB. The multivariate analysis identified anaemia and ethnicity as independent risk factors.
POCD rates are similar between Asian and Caucasian populations. Preoperative anaemia is a significant risk factor (RR = 1.621, 95% CI = 1.017-2.583), however the mechanism of this is unknown. With a prevalence of 10% in patients undergoing cardiac surgery[2], it is an important issue.
Non-chinese patients have a higher POCD incidence than Chinese; they were classed as: others, Malays, Indians (respective RR = 2.213, 2.108 and 1.042, 95% CI = 1.231-3.978, 1.148-3.872 and 0.559-1.940). Their higher incidences of metabolic syndrome may account for complications such as POCD.
**Conclusion:** Our findings may be of significance in enabling the risk stratification of patients undergoing cardiac surgery, and pre-operative measures may be taken to increase haemoglobin levels and thereby reduce POCD risk.
**References:**
1. Neurology. 1990 Oct;40(10):1541-5
2. Can J Anaesth. 1999 Oct;46(10):979-82

## 07AP04-12

### Cardiac tumours: review of 19 cases in the last 6 years

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**Background:** Primary cardiac tumors are infrequent in daily practice, affecting approximately 0,002% of population. Atrial myxoma is the most common. Ultrasound echocardiography is essential in the control of the surgery consisting in removal of the tumor, and the repair of the associated complications, so it has become an indispensable monitoring tool for the anesthesiologist.
**Material and methods:** Retrospective analysis of the health care quality in the last six years. Demographic data, debut symptoms, histology and the role of the transesophageal echocardiography (TEE) as a part of the monitoring during the surgery were analysed.
**Results and discussion:** 74% were primary tumors, being myxoma the most frequent (68%). Most common location was the left atrium. In this series cardiac symptoms are the most frequent (59%). Among them, dyspnoea is the most prevalent (41%), followed by palpitations (12%), chest pain (29%) and syncope (24%).
In myxoma group, similar data has been obteined comparing with the available literature: 63% were histologically myxoma (75% in the literature), 83% were female; mean age was 65 years. 50% had dyspnoea, and palpitations appeared in 17%. Chest pain and syncope affected 33% of our patients. Embolic symptoms occurred in 17% of patients, and there were also systemic signs. Left atrium is the most common location (85%). Only one patient requested valve substitution.
In all cases, diagnosis and preoperative evaluation was given by transthoracic echocardiography (TTE), whereas during the intraoperatory was done by TEE. In 17%, TEE was essential to complete the study, to know the implantation base and to discard valv affection. TEE is the election method to confirm the complete excision and to discard complications after resection of intracardiac masses.
Demographic data is similar comparing with the available data, with few differences that could be explained by the number of cases. Preoperative evaluation using TTE can not always pinpoint valve disease, so morphological and functional assessments by intraoperative TEE helps to avoid unnecessary surgical therapies such as valve replacement.
**Conclusions:** Even though it is not a large series, it is representative according to the available literature. Preoperative TTE was not accurate enough in all cases, but TEE proved to be able to confirm the site of implantation and extension of the mass, and the structural and functional affectation of the adjacent valve.

## 07AP05-1

### The choice of anesthetic agent does not predict the occurrence of postoperative delirium after cardiac surgery: a prospective observational study

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**Background and Goal of Study:** Postoperative delirium (PD) after cardiac surgery is a major problem and results in increased morbidity. Studies have suggested that a sevoflurane-based anesthesia was better associated with short-term cognitive function than propofol.[1]We sought whether the choice of the anesthetic agent could influence the incidence of PD in a cohort of patients undergoing all types of cardiac surgery with or without cardiopulmonary bypass.
**Materials and methods:** This is a sub analysis of a large prospective observational trial evaluating the neurologic outcome of adult patients undergoing cardiac surgery (NCT02006212).A total of 1500 patients will be included for the purposes of the study.In all patients cerebral oxygen saturation ($ScO_2$) is measured at baseline. Subjects are evaluated for PD during the entire hospital stay. At the ward, the evaluation is performed every 4 to 6 hours. No standard screening tests are used.
However, signs and symptoms of hypoactive, hyperactive and mixed delirium are detected.Data are expressed in median (P25-P75) or numbers and percentages. A Mann-Whitney and a Chi square test are used to compare respectively continuous and dichotomous variables between both groups.A binary

regression analysis was performed to predict PD. The type and the total dosis of anesthetic agents were considered as independent variables. P<0,05 is considered significant.
**Results and discussion:** 620 patients were analyzed. PD occurred in 20% of the patients. Patients' characteristics are illustrated in table 1.

| | PD (N=126) | No PD (N=494) | P |
|---|---|---|---|
| **Age (Years)** | 74 (64-80) | 67 (57-75) | <0,001 |
| **Baseline mean Sc02 (%)** | 61 (56-67) | 63 (56-69) | 0,013 |
| **Surgery with open left cavities** | 87 (69%) | 321 (65%) | 0,54 |
| **Sevoflurane** | 84 (67%) | 322 (65%) | 0,84 |
| **Midazolam** | 121(96%) | 477 (97%) | 0,04 |
| **Total dose midazolam per weight (mg/kg)** | 0,048 (0,033-0,060) | 0,048 (0,034-0,058) | 0,82 |
| **Ketamine** | 106 (84%) | 443 (65%) | 0,01 |
| **Total dose Ketamine per weight (mg/kg)** | 0,36 (0,24-0,48) | 0,38 (0,26-0,47) | 0,55 |

*[Patients' characteristics with or without PD]*

The Hosmer-Lemeshow test was positive (P =0,552). Age was the only independent predictor of PD: Odds-Ratio:1,039(95% CI:1,021-1,058), P=0,000.
**Conclusion(s):** This is the first large prospective study evaluating the impact of the anesthetic regimen on the incidence of PD. Our preliminary results show that the choice of the anesthetic agent does not influence the incidence of PD after cardiac surgery. Age remains the only independent predictor.
**Reference:**
SchoenJ et al. BJA 2011

## 07AP05-2

### Impact of carotid intima-media thickness on the incidence of major adverse cardiac and cerebrovascular event after off-pump coronary artery bypass

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**Background and Goal of Study:** Prediction of major adverse cardiac and cerebrovascular event (MACCE) after off-pump coronary artery bypass surgery (OPCAB) would be of clinical importance and yet, it proves to be difficult. Carotid intima-media thickness (IMT) is a well-known predictor for MACCE in cardiac patients.
However, evidence is limited regarding its predictive role on MACCE in patients undergoing OPCAB. Thus, we hypothesized that carotid IMT could be used for predicting MACCE after OPCAB.
**Materials and methods:** Data from 323 patients who underwent OPCAB in a university hospital between April 2013 and October 2015 were retrospectively reviewed. MACCE was defined as the presence of cardiac arrest, acute myocardial infarction, congestive heart failure, angina, stroke, cardiovascular death, or cerebrovascular death in the follow-up period. Increased carotid IMT was defined as carotid IMT ≥0.9mm on one or both sides. We constructed logistic regression analyses to find independent risk factors including carotid IMT for the development of MACCE following OPCAB.
**Results and discussion:** The incidence of MACCE was 7.5% in the normal IMT group vs. 15.3% in the increased IMT group (p=0.026). Patients in the increased IMT group were older with a higher incidence of Katz atheroma grade ≥4 (41.0% vs. 58.0%, p=0.002) relative to those of the normal IMT group. Multivariate logistic regression analysis revealed that history of DM and CVA, the number of grafts performed, and increased IMT (OR=2.271, 95% CI; 1.074 - 4.803, p=0.032) were independent predictors of MACCE.
**Conclusion:** In patients undergoing OPCAB, assessment of carotid IMT may allow a more comprehensive risk stratification in terms of predicting the development of MACCE.

| | Normal IMT (n=173) | Increased IMT (n=150) | P-value |
|---|---|---|---|
| Sex (M/F) | 137/36 | 118/31 | 0.999 |
| Age (years) | 62.88±9.61 | 67.21±12.22 | <0.001* |
| Katz grade | 3.31±0.78 | 3.64±0.76 | <0.001* |
| Katz grade ≥ 4 | 71 (41.0%) | 87 (58.0%) | 0.002* |
| MACCE | 13 (7.5%) | 23 (15.3%) | 0.026* |
| Mortality | 2 (1.2%) | 7 (4.7%) | 0.087 |

*[Table 1. Demographic and clinical data]*

| | Univariate OR (95% CI) | Univariate P-value | Multivariate OR (95% CI) | Multivariate P-value |
|---|---|---|---|---|
| Age | 1.013 (0.976-1.052) | 0.503 | | |
| BMI > 30 | 3.847 (1.121-13.206) | 0.032* | 2.601 (0.681-9.932) | 0.162 |
| DM | 0.412 (0.201-0.846) | 0.016* | 0.427 (0.200-0.913) | 0.028* |
| CVA | 2.856 (1.228-6.640) | 0.015* | 3.091 (1.263-7.569) | 0.013* |
| CKD | 0.622 (0.210-1.841) | 0.392 | | |
| Number of graft | 0.580 (0.362-0.930) | 0.024* | 0.553 (0.337-0.906) | 0.019* |
| IMT ≥0.9 | 2.229 (1.086-4.574) | 0.029* | 2.271 (1.074-4.803) | 0.032* |

*[Table 2. Logistic regression analysis for predicto]*

## 07AP05-3

### Long-term effects of hydroxyethyl starches on kidney function in cardiac surgery patients

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**Introduction:** Hydroxyethyl starches 130/0.4 [HES] may affect renal function but this effect has not been demonstrated in surgical patients. In addition, long-term effect of HES on surgical patient's renal function has not been studied so far. This study aimed at evaluating long-term impact of HES on renal function in cardiac surgery patient.
**Method:** In 2012, we conducted a randomized controlled trial comparing the short-term effects of two balanced HES (maize-derived: volulyte® and potato-derived: plasma volume redibag®) on blood loss, renal function, and incidence of post-operative complications in patients undergoing elective cardiac surgery (N=118). Volume expansion was achieved with HES from the day of surgery until the 2nd post-operative day (POD2) and was titrated using stroke volume variation measurements. After IEC approval, we retrospectively evaluated long-term renal function of patients having participated to this study. Glomerular filtration rate (eGFR) was calculated using CKD-EPI formula.
Statistical analysis was achieved using mixed models, including the following covariates: type of surgery, cardiopulmonary bypass and surgical times, source of HES, POD2 fluid balance and amount of HES perfused. Data are presented as mean ± SD. A p value <0.05 was considered statistically significant.
**Results:** 91 patients were included in our study, with a mean time follow-up of 438 days.

| | eGFR (m±SD) | Creatinine (m±SD) * |
|---|---|---|
| **Pre-operative time** | 73.93 ± 16.29 | 0.94 ± 1.27 |
| **2nd post-operative day** | 74.28 ± 21.67 | 0.87 ± 1.55 |
| **Hospital discharge** | 74.52 ± 16.23 | 0.93 ± 1.31 |
| **97 days after surgery** | 69.43 ± 17.27 | 0.98 ± 1.28 |
| **438 days after surgery** | 72.32 ± 16.52 | 0.97 ± 1.27 |

*[Table 1]*
*p= 0.0068

Glomerular filtration rate did not change significantly over the study period, which was in contrast with plasma creatinine value. Forty-eight hours positive fluid balance was the only covariable associated with a significant increase in postoperative serum creatinine.

**Discussion:** Although creatinine values varied significantly over time, observed changes did not appear clinically relevant. The fact that 48h positive fluid balance could be associated with long-term deterioration of renal function is in accordance with the actual literature.
**Conclusion:** Balanced HES solutions do not appear to have clinically relevant long term-effect on renal function.

## 07AP05-4

### Obstructive sleep apnea and postoperative outcomes after cardiac surgery

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**Background and Goal of Study:** Obstructive sleep apnea (OSA) is highly prevalent and frequently under recognized in patients undergoing cardiac surgery. The aims of our study were to evaluate the incidence of OSA in patients referred to elective cardiac surgery and analyze the impact of this pathology on postoperative outcomes.
**Materials and methods:** A prospective analysis of 151 consecutive patients was conducted in tertiary referral university hospital. Approval of institutional ethics committee was obtained for this study. Patients referred to elective cardiac surgery were evaluated for OSA prevalence using STOP-bang questionnaire. Intensive care delirium screening checklist (ICDSC) was used for evaluation of delirium. We analyzed the impact of OSA on morbidity, postoperative delirium and length of hospital stay.
**Results and discussion:** A total of 108 patients were included in final data analysis. The overall incidence of OSA was 80,6%. Sleep disturbances were noted only in 35,2 % of patients in OSA group, comparing with 11.1 % in non-OSA group (p = 0,04). Patients with OSA had significantly higher preoperative body mass index (29, 0 vs 24,8 kg/m2, p <0.001). Comparison of other preoperative variables did not reveal any statistical differences. Comparing postoperative outcomes OSA patients had a prevalence for longer mechanical ventilation (13,5 vs 8,5 hours, p = 0,03) and unfavorable neurological outcomes with significantly relevant occurrence of postoperative delirium (26,6 % vs 5,9 %, p = 0,03). None of the patients in non-OSA group experienced stroke, comparing with 2,3 % in OSA group . Complicated postoperative course alongside with increased incidence of low cardiac output syndrome postoperatively (12,6 % vs 0 %, p = 0,03) resulted in overall longer in hospital stay (22,2 vs 19 days) and higher mortality rates (2,3 % vs 0 %).
**Conclusions:** Obstructive sleep apnea is frequent in patients undergoing cardiac surgery. Our data confirm that there is a direct correlation of OSA and postoperative delirium, low cardiac output syndrome and prolonged mechanical ventilation.
**Reference:**
1. Roggenbach J, Klamann M, von Haken R, Bruckner T, Karck M, Hofer S. Sleep-disordered breathing is a risk factor for delirium after cardiac surgery: a prospective cohort study. Crit Care. 2014 Sep 5;18(5):477

## 07AP05-5

### Is the EuroSCORE II reliable to estimate operative mortality among patients over 80 years?

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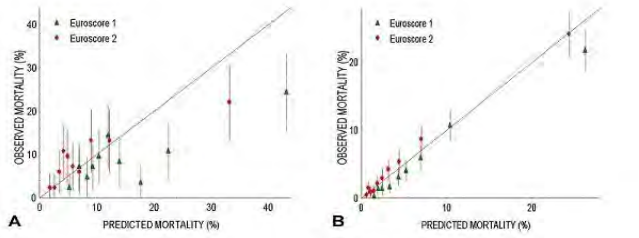
**Background and Goal of Study:** Concerns have been raised regarding the reliability of the logistic EuroSCORE (ES I) to estimate operative mortality (OM) of patients aged ≥80. The EuroSCORE II (ESII) has been described to achieve an accurate prediction of OM but external validations are scarce and its performance has not been specifically studied among high-risk patients such as the octogenarians. The goal of the study was to assess the predictive performance of ES II among the overall population and patients ≥ 80 (as compared to the predictive performance of ES I).
**Materials and methods:** The ES I and ES II were computed among 7161 consecutive patients who underwent cardiac surgery over a six years period. Among them, 832 (12%) patients were ≥80. Discrimination was assessed using the c- index and calibration (Hosmer-Lemshow and calibration plot) by comparing predicted and observed mortality. The study was approved by Bichat Hospital Institutional Review Board.
**Results and discussion:** Mean age was 63±14 years. Mean ES I was 7.36±9.43 [0.88-88.48] and mean ES II was 5.17±9.07 [0.49-94.42]. 832 (12%) patients ≥80 years (49% female) were analyzed. Mean age was 83 ± 3 years. The mortality was 9.38% (≥80 years) vs 5.18 %(<80 years).
Discrimination and Calibration among the overall population and according to age:

| | Overall population | <80 years | ≥80 years |
|---|---|---|---|
| n | 7161 | 6329 | 832 |
| c-index ES I | 0.79 [0.77-0.81] | 0.80 [0.78-0.83] | 0.64 [0.58-0.71] |
| c-index ES II | 0.80 [0.78-0.82] | 0.81 [0.79-0.84] | 0.67 [0.60-0.73] |
| p ESI/ESII | 0.07 | 0.21 | 0.35 |
| p calibration ES I | <0.001 | 0.001 | <0.0001 |
| p calibration ES II | 0.006 | 0.13 | <0.0001 |

*[Table 1]*




*[Figure]*

**Conclusion(s):** The ES II has a better predictive performance than the ES I in patients <80. Its discrimination and calibration are less satisfying in patients ≥80, showing an important overestimation in the elderly at very high surgical risk. Others tools are necessary, such as markers of frailty, to improve the predictive performance of ES II in this specific high-risk population.

## 07AP05-6

### Outcome of patients with temporary circulatory support prior to durable LVAD implant

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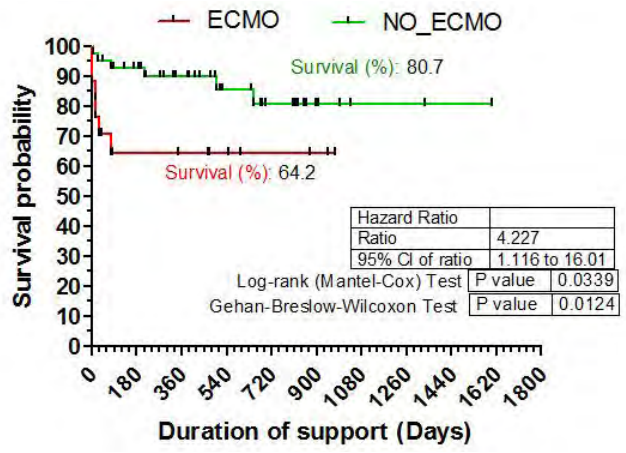
**Background and Goal of Study:** In our institution 29% of the patients receiving a left ventricular assist device (LVAD) were of INTERMACS (INTR) 1 profile (critical cardiogenic shock). This is twice the reported frequency for INTR 1 profile in the Sixth INTERMACS annual report including patients having received an assist device between 2008 and 2013. All our INTR 1 patients were on veno-arterial extracorporeal membrane oxygenation (ECMO) using a Stöckert centrifugal pump before insertion of a HeartWare HVAD pump. We report hereafter our results obtained in this particular group of patients.
**Materials and methods:** Since June 2011, the HeartWare HVAD pump is the standard LVAD placed in our institution by sternotomy under extracorporeal circulation.
We created a database of all patients implanted with a HeartWare LVAD, extracting those with a INTR 1 profile.
Survival of our INTR 1 profile patients after LVAD placement is reported using a Kaplan-Meier survival plot and we compared survival using the log-rank and Gehan-Wilcoxon tests with the other INTR profiles.
**Results:** Seventeen of the total series of 59 patients were of INTR 1 profile (ECMO duration: 1 to 17 days).
Age ranged from 17 to 65 yrs, 64.7% were males, and 64.7% suffered from ischemic heart disease and 35.3% had idiopathic dilated cardiomyopathy.
The outcome under LVAD support and for overall survival including subsequent transplant or weaning is presented in Table 1.

| | Number of patients (%) | Duration of LVAD support (days) : Mean ± SD (Median) | Duration of LVAD support (days): Range | Duration of overall survival (days) : Mean ± SD (Median) | Duration of overall survival (days): Range |
|---|---|---|---|---|---|
| Remain alive on HeartWare | 4 (23.5%) | 374 ± 219 (407) | 83 - 598 | 374 ± 219 (407) | 83 - 598 |
| Transplanted | 5 (29.4%) | 620 ± 377 (596) | 41 - 972 | 824 ± 476 (948) | 97 - 1279 |
| Weaned after recovery | 2 (11.8%) | 671 ± 286 (671) | 469 - 873 | 844 ± 424 (844) | 544 - 1144 |
| Died on HeartWare | 6 (35.3%) | 24 ± 29 (16) | 1 - 78 | 24 ± 29 (16) | 1 - 78 |
| Died - Total mortality (one patient died after weaning) | 7 (41.2%) | 87 ± 170 (17) | 1 - 469 | 98 ± 198 (17) | 1 - 544 |
| Total | 17 (100.0%) | 358 ± 355 (347) | 1 - 972 | 438 ± 458 (347) | 1 - 1279 |

*[Table 1 - Outcome]*

Survival under HeartWare support is presented in Figure 1, and compared with the survival of the other patients (INTR profile 2 and 3) of our institution.




*[Figure 1 - Survival under Heartware support]*

**Conclusion:** Although survival of INTR 1 patients was worse than for the other patients, there was a 64.2% probability of survival after 3 years of HeartWare support, meaning that preoperative ECMO does not preclude placement of a LVAD.

## 07AP05-7

### Neutrophil-lymphocyte ratio as a risk factor for early postoperative cognitive dysfunction after off-pump coronary surgery

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**Background and Goal of Study:** Postoperative cognitive dysfunction (POCD) is a devastating complication of cardiac surgery. The underlying cause of the POCD is a multifactorial, systemic inflammation that may lead to cognitive dysfunction. Neutrophil-lymphocyte ratio (NLR) is a readily available marker of systemic inflammation. We assessed whether patients with consistently elevated NLR have an increased risk of cognitive dysfunction 1 week after off-pump coronary artery bypass grafting (OPCAB).
**Materials and methods:** One hundred twenty-seven Japanese patients (≥60 y.o.) scheduled for OPCAB were enrolled from 2004 to 2014. All underwent preoperative brain magnetic resonance imaging (MRI), angiography, and intraoperative epiaortic ultrasound to assess prior cerebral infarcts, white matter lesions, craniocervical artery stenosis, and atherosclerosis of the ascending aorta. NLR before surgery, postoperative day 1 and days 6 - 8 were reviewed retrospectively. Four cognitive tests were performed preoperatively and 1 week after surgery. POCD was defined as a decrease of at least 20% from baseline in performance on more than two test. Statistical comparisons between those with and without POCD were performed using the $\chi^2$ test and one-way analysis of variance. Stepwise logistic regression assessed the predictors of POCD.
**Results and discussion:** POCD was identified in 25 of the 127 patients (20%). Although preoperative NLR and on postoperative day 1 did not differ between the two groups, patients with POCD had significantly higher NLR during postoperative days 6 - 8 than those without POCD (5.9±4.7 vs. 3.7±2.4, P<0.01). In the multivariate model, periventricular white matter lesions [odds ratio (OR) 2.3], age ≥75 y.o. (OR 3.8), males (OR 3.4), and NLR on postoperative day 6 - 8 (OR: 4.2 [1.4-13.0], P=0.01) were associated significantly with early POCD in OPCAB patients. Elevated NLR levels are usually considered as an inflammatory marker. The results of this study suggested that prolonged inflammation plays a role in the pathogenesis of early POCD.
**Conclusions:** The incidence of POCD was 20% (25/127). Periventricular white matter lesions, age≥75 y.o., male, and NLR of postoperative day 6 - 8 were independent predictors of POCD. Prolonged elevated NLR appears associated with early POCD in off-pump coronary surgical patients.

## 07AP05-8

### Usefulness of neutrophil-lymphocyte ratio to predict postoperative delirium after cardiac surgery

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**Background and Goal of Study:** Postoperative delirium (PD) is a common complication after cardiac surgery. Persistent neuro-inflammation is among the hypothetical pathophysiologic mechanisms.Neutrophil-Lymphocyte Ratio (NLR) has been shown to reflect alzheimer's disease-related inflammatory process in the periphery.[1] We hypothesized that the preoperative and peak postoperative NLR would predict PD in cardiac surgery.
**Materials and methods:** This is a sub-analysis of an ongoing prospective study evaluating neurologic outcome of patients undergoing cardiac surgery with or without cardiopulmonary bypass (NCT02006212). A total of 1500 patients will be included for the purposes of the study. Subjects are evaluated for PD during the entire hospital stay. At the ward, the evaluation is performed every 4 to 6h. No standard screening tests are used. However, signs and symptoms of hypoactive, hyperactive and mixed delirium are detected. Data are expressed in median (P25-P75). A Mann-Whitney test is used to compare groups. A binary regression analysis is used to predict PD.
**Results and discussion:** In total 620 patients were analyzed. 20% of subjects suffered from PD. Table 1 shows patients' characteristics.

| | PD (N=126) | No PD (N=494) | P |
|---|---|---|---|
| **EuroSCORE II; %** | 1,93 (1,08-3,64) | 1,67 (0,94-3,13) | 0,01 |
| **Preoperative NLR** | 2,61 (2,22-3,82) | 2,75 (2,05-4,06) | 0,82 |
| **Peak NLR** | 14,6 (10,59-20,24) | 14,25 (10,67-19,54) | 0,53 |
| **Age; years** | 74 (64-80) | 67 (57-75) | <0,001 |
| **Preoperative Hb (g/dL)** | 13,6 (12,2-14,6) | 14,0 (12,8-15,0) | 0,02 |
| **Cardiopulmonary bypass time; minutes** | 102 (77-138) | 105(74-138) | 0,97 |
| **Cross-clamp time; minutes** | 72 (54-99) | 77 (50-105) | 0,84 |
| **Length of stay in hospital; days** | 10 (7-14) | 8 (7-11) | <0,001 |

*[Characteristics of patients with or without PD]*

The Hosmer-Lemeshow test was valid (P=0,543). Age was the only independent predictor of PD : Odds Ratio=1,036 (95% Confidence Interval: 1,017-1,055); P <0,001. NLR did not seem to be a marker of PD neither in univariate nor in multivariate analysis.
**Conclusion(s):** The incidence of PD in our population is in line with previous publications although no screening tests were used as an objective evaluation. This is the first prospective study evaluating the impact of NLR as an inflammatory marker on the incidence of PD in cardiac surgery. Our preliminary results do not support the hypothesis of a delirium-related inflammatory process in the periphery.
**Reference:**
1. Rembach A, et al.J Neuroimmunol 2014

## 07AP05-9

### Predictors of mortality of dialysis-requiring acute kidney injury patients after cardiac surgery

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**Background and Goal of Study:** Acute kidney injury requiring dialysis (AKI-D) is a serious complication of cardiac surgery with cardiopulmonary bypass and has a high in-hospital mortality of 60%-70%[1]. However, the predictors of long term mortality of patients that survived till discharge from hospital have not been well studied. In this study, we aimed to determine the predictors of long term mortality of AKI patients that had a new need for dialysis after cardiac surgery.
**Materials and methods:** With institutional review board approval, we prospectively recruited 3008 patients who underwent cardiac surgery at the two main heart centres in Singapore between August 2008 and July 2012. Perioperative safety and outcomes data were prospectively collected and entered into a cardiac anaesthesia database. The exclusion criteria was patients who were on renal replacement therapy prior to surgery. Post-operative AKI was defined using the Acute Kidney Injury Network criteria. The decision to initiate dialysis was based on the combined decision of the intensivist and the nephrologist. Information about the mortality of patients was obtained from the Singapore births and deaths registry.
**Results and discussion:** Between 2008 and 2012, a total of 3008 patients underwent cardiac surgery on cardiopulmonary bypass. 46.3% were diabetic, 80.4% were male and the average euro score was 3.8 ± 5.3. 56 AKI-requiring dialysis patients met the criteria for analysis. The average euro score for these patients was 9.9 ± 15.9. Over a 4.4 ± 2.8 year follow up, the mortality rate was 37.5%. 28.6% died before discharge and 8.9% died after discharge. For those who died in-hospital, the length of hospitalisation was 31 ± 52 days.
Factors predictive of mortality were: pre-existing congestive cardiac failure (p = 0.044), patients with acidosis (p =0.010) and persistently low bicarbonate (20.5 ± 3.6, p = 0.004) after the first session of dialysis and longer duration of inotrope use in the ICU (p= 0.023).
**Conclusion(s):** We conclude from the study that pre-existing congestive cardiac failure, acidosis, persistently low bicarbonate and long duration of inotrope use are important predictors of mortality in patients with AKI-requiring dialysis. Aggressive management of acidosis remains one of the keys to preventing mortality in these high risk populations.
**Reference:**
1. Rosner MH, Okusa MD. Acute kidney injury associated with cardiac surgery. Clin J Am Soc Nephrol 2006; 1: 19-32

## 07AP05-11

### The effects of anesthetic hypnotic in relation to vasopressor drug requirements, 30-day mortality and morbidity after cardiac surgery

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**Background:** Etomidate has beeen the anesthetic hypnotic agent of choice for cardiac surgery during many years due to his haemodynamic stable effect. It is reported that impairs in adrenal function due to the use of etomidate in anesthesic induction after noncardiac surgery is associated with an increased mortality. The aim of our study is to evaluate vasopressor drugs requirements during the first 24 hours after cardiac surgery when using etomidate or propofol as main induction agents.
**Methods:** Perioperative data for 102 patients undergoing cardiac surgery have been retrospectly reviewed. Etomidate was used as anaesthetic inductor in 71 patients while propofol was used in 31. A multivariate analysis was not possible because of the small size of the sample, but big differences were not observed between the two groups. Statistical association between the induction agent and the qualitative variables were analysed by the ji square Mantel-Haenszel association test, and the risk ratio given. Quantitative variables association with the hypnotic agent was analysed with the t test.
**Results:** No significant statistical differences were found between the two groups when analysing mortality (risk ratio (RR) for using propofol 4.44 (IC 95%: 0,59-33,27); p= 0,1); vasopressor drugs requirements at the first hour (RR for porpofol 1,11 (IC 95% 0,92-1,33; p= 0,20)), after 24 hours
(RR 1,36 (IC 95%= 0,76-2,42; p= 0,28)) or after 48 hours (RR 1,31 (IC 95%= 0,62-2,77; p= 0,46)) of stay at the intensive care unit (ICU); in the length of stay at the ICU (mean time for etomidate patients: 3,49 days vs. 2,84 days in propofol group (p=0,66 (IC95%: -3,54-2,25)) or in the main time of stay at the hospital (10,77 days for the etomidate group vs. 9.39 for propofol group (p=0,43)
(IC 95%= -4,83-2,07)).
**Conclusions:** Differences in vasopressor drug requirements were not found when comparing etomidate with propofol as main anesthetic induction agent. Etomidate used as the induction agent for cardiac surgery patients is not associated with higher mortality or morbidity rates when comparing with propofol. Prospective studies and a large sample size are needed.
**Reference:**
Komatsu R, You J, Mascha EJ, et al. Anesthetic induction with etomidate, rather than propofol, is associated with increased 30-day mortality and cardiovascular morbidity after noncardiac surgery. Anesth Analg. 2013 Dec; 117 (6): 1329-37.

## 07AP05-12

### A rare complication after heart valve surgery

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**Background:** Development of iatrogenic membranous VSD following valve surgery is a rare complication.It results not only from technical surgical complications but also from postoperative endocarditis.
**Case report:** 71 years old lady after mitral valve replacement in 1998, with severe aortic stenosis, atrial fibrillation and severe pulmonary hypertension, was admitted at Cardiology department because of paravalvular mitral regurgitation accompanied by hemolytic anemia. Global systolic function of the heart was good. She was operated several months ago and re-MVR and AVR were performed. Postoperatively she was stable on triple vasoactive/inotropic support and extubated the same day.
However, on the third postoperative day she become unstable and frail, with signs and symptoms of respiratory and heart failure. Control TEE and oximetry run revealed left-to-right shunt between the right atrium (RA) and the left ventricle (LV) in the area of atrioventricular septum (between the orifice of the coronary sinus and left ventricular outflow tract-LVOT). She was re-operated on the sixth postoperative day. Control TEE afterwards showed competent artificial aortic and mitral valve, a moderate tricuspid regurgitation and a minimal residual left-to-right shunt on the level of coronary sinus.
However, three days afterwards pneumonia and sepsis developed, with acute renal and hepatic failure. Despite adequate antibiotic and renal replacement therapy, the medical course was continuously deteriorating and she died sixteen days after the first surgical procedure.
**Discussion:** Here we report a case of iatrogenic perimembranous VSD after valve surgery. The surgical closure was indicated because the defect was hemodinamically relevant and the patient was symptomatic. This is first complication of that kind at our hospital.It is a rare condition and should be kept in mind in patients who present with progressive dyspnea after valve surgery.
**Reference:**
1. Shi-Min Yuan. A systematic review of acquired left ventricle to right atrium shunts (Gerbode defects). Hellenic J Cardiol 2015; 56: 357-372.
**Learning points:** Gerbode defect is a congenital LV to RA communication.It also refers to iatrogenic LV to RA communications, as a result of a defect in the supravalvular portion of interventricular septum (IVS). This shunt should be suspected when peak systolic gradient is very high (LV to RA) with a diastolic flow in the same direction and RA enlargement. It shouldn't be confused with tricuspid regurgitation.

## 07AP05-13

### Heart donation with known atrial myxoma: a case report

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**Background:** Cardiac myxomas are benign tumors derived from mesenchymal tissue. 75% of them originate in the left atrium. Third of patients with cardiac myxoma may suffer a stroke, most oftenly cerebral, the most common cause of death in these. No data on donation with known heart myxoma.
**Case report:** 66 years old patient, on waiting list for heart transplant with terminal ischemic heart disease. Other clinical record: hypertension and hypercholesterolemia.
In September 2015 an orthotopic heart transplantation takes place. The donor is a 39 year old woman who died from a hemorrhagic stroke.
While scanning the donor organ a mass is found in the left atrium that is removed during the extraction and pathology confirms that it is a myxoma. Corresponding to the location of the myxoma there is an atrio-ventricular comunication that is closed. The patient ends bypass needing continuous infusion of vasoactive drugs with hemodynamic stability. Prior to the closure, wide spread constant bleeding is seen and is controlled by protamine and meticulous hemostasis.
The postoperative course was uneventful, except for the apearence of oral aphthas from HSV type 1 that were infected by Serratia. In later revisions the endomyocardial biopsy revealed fibrosis, the cardiac catheterization showed slight postcapillary hypertension and the echocardiogram was normal.
**Discussion:** After reviewing the existing literature we found no other reported cases of cardiac transplantation with a history of atrial myxoma. There are two publications of heart transplant receptors who developed myxomas 8 and 13 years after undergoing surgery and studied tissue samples proved they came from donor (1). There are also reported two cases of kidney, liver and pancreas (2) donations whose donor had a known atrial myxoma.
**References:**
1. Claire E. Bamberg. *Donor transmitted left atrial myxoma 13 years after heart transplantation.* Ann transplant, 2011; 16(4): 118-121.
2. R.J. Canter. *Successful liver,Kidney, and pancreas transplantation from a donor with cerebral emboli from left atrial myxoma.* Trasplantation Proceeding, 37, 4334-4336 (2005).
**Learning points:** Although follow up of the patient is limited, we suggest that the presence of atrial myxoma in heart donation should not contraindicate transplantation. Considering the limited number of heart donors and the risk of dying during waiting list it seems to be acceptable to assume the low risk of tumor reappearance.

## 07AP06-1

### Postoperative myocardial infarction after vascular surgery: incidence, predictors and outcomes - a prospective study

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**Background and Goal of Study:** Patients proposed to vascular surgery (VS) have several comorbidities associated with cardiac events. Additionally, VS patients have an intermediate to high-risk of postoperative myocardial infarction (PMI). The aim of this study was to evaluate the incidence, predictors and outcomes of PMI after VS.
**Materials and methods:** Observational prospective study, approved by the institutional ethics committee, including patients submitted to elective VS between January and April 2015. Exclusion criteria: age <18 years and venous surgery. Patient's demographics and perioperative data were collected. As part of a postoperative care protocol, troponin measurements were assessed in high risk or symptomatic patients and an elevation superior to 0.034 ng/ml in the first postoperative 72 hours was considered as PMI. Descriptive analysis was performed and the Student's-T, Mann-Whitney, Fischer's exact or Chi-square tests were used. Univariate and multivariate logistic regression were done with calculation of an Odds Ratio (OR). Hosmer-Lemeshow test for Goodness of fit and Area under the receiver operating curve (AUROC) were also analyzed.
**Results and discussion:** A total of 306 patients were included. Incidence of PMI was 6.2%. Patients with PMI had longer hospital length of stay (LOS) (54.0 [27.0-68.0] vs 17.0 [6.0-37.0], p<0.001) and higher mortality rate (p=0.023). No differences were found regarding the type of anaesthesia (p=0.385). ASA physical status IV/V, reduced functional capacity defined as MET<4, history of congestive heart failure, ischemic heart disease (IHD), diabetes mellitus (DM), DM with end organ damage, chronic kidney disease, preoperative insulin and antiaggregation therapies and Revised Cardiac Risk Index (RCRI) >2 were considered predictors of PMI in univariate analysis. On multivariate analysis, history of IHD (OR 3.9, p=0.018), reduced functional capacity (OR 7.8, p=0.001), preoperative insulin therapy (OR 8.2, p<0.001), preoperative antiaggregation therapy (OR 6.3, p=0.025) and ASA physical status IV/V (OR 4.3, p=0.029) were considered as independent predictors of PMI. Hosmer-Lemeshow test was 0.828 and AUROC was 0.857 compared to 0.759 of RCRI.
**Conclusion(s):** PMI after VS was frequent. Patients with PMI had longer LOS and higher mortality rate. History of IHD, reduced functional capacity, ASA physical status IV/V and preoperative insulin and antiaggregation therapies were identified as independent predictors for PMI.

## 07AP06-2

### The effects of anaesthesia on cerebral oxygenation and cognitive function in elective carotid endarterectomy

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**Background and Goal of Study:** Volatile anaesthetics interfere with cerebral blood flow and reperfusion-ischemia injury via the mechanism known as a preconditioning. A transient deterioration of local hemodynamics and oxygenation during carotid endarterectomy (CEE) might involve both hemispheres of brain and affect postoperative cognitive function. The goal of this study was to assess the effects of anaesthetics on perioperative cerebral oxygenation and cognitive functions.
**Materials and methods:** Forty patients (males only; $n$ = 40, age 63 (59-68) yrs, weight 80 (70-90) kg) who underwent elective CEE were included into a prospective study and randomized to two groups receiving either total intravenous anaesthesia (TIVA group, $n$ = 20; propofol+fentanyl) or the volatile induction and maintenance of anaesthesia (VIMA group, $n$ = 20, sevoflurane+fentanyl). All patients were operated using temporary carotid bypass. Invasive arterial pressure (AP), gas exchange, and cerebral tissue oxygen saturation ($SctO_2$) over frontal region for ipsilateral ($SctO_{2IPSI}$) and contralateral ($SctO_{2CONTR}$) hemispheres (ForeSight, USA) were registered during the surgery and up to 24 hrs of the postoperative period. The cognitive changes were assessed 12 hrs before as well as 1 and 5 days after CEE with blinded investigator using Montreal Cognitive Assessment score (MoCA).
**Results and discussion:** We did not find any significant baseline differences between groups. The VIMA demonstrated reduced mean AP compared with TIVA group during the intervention, however $SctO_{2CONTR}$ on the primary carotid clamping was higher during sevoflurane anaesthesia (p=0.05). In contrast, we did not observe any intergroup differences in $SctO_{2IPSI}$. In both groups, $SctO_{2IPSI}$ decreased at the clamping and unclamping of carotid artery compared with values at start. We observed better cognitive function by Day 5 after sevoflurane compared with the TIVA group: the MoCA values were 24 (20-25) pts. vs. 20 (16-23) pts., respectively, p=0.028). In contrast, the patients of the TIVA group demonstrated significant reduction of MoCA values after the intervention (p <0.01).
**Conclusion(s):** In CEE, total inhalational anaesthesia with sevoflurane preserves blood flow and oxygenation of the contralateral hemisphere and is associated with improved postoperative cognition as compared with propofol anaesthesia.
**Acknowledgements:** We thank the personnel of the Vascular Surgery Dept., Municipal Hospital #1 of Arkhangelsk.

## 07AP06-3

### High inspired oxygen concentration may reduce brain hypoxia in the patients undergoing carotid endarterectomy with total intravenous anesthesia

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**Background and Goal of Study:** High inspired oxygen concentrations may improve cerebral tissue oxygenation in the patents undergoing carotid endarterectomy (CE). However, there are some studies suggesting that high inspired oxygen concentration may induce cerebral vasoconstriction. This study was performed to measure the influence of $FiO_2$ on the regional tissue oxygenation ($rSO_2$) in the patients undergoing CEA with total intravenous anaesthesia (TIVA).
**Materials and methods:** After ethics committee approval and patients' written informed consent were obtained, 28 patients undergoing elective CE were randomized to receive TIVA with 35% inspired $O_2$ (group A) or TIVA 100% $O_2$ (Group B). The INVOS 5100B monitor was used for $rSO_2$ measurement from operative and nonoperative side, and INVOS Analytics Tool (Covidien) for AUC calculations. A bispectral index and invasive blood pressure monitoring were used in all patients. Data were analysed using two sided T-test and Fisher exact test. A $P<0.05$ was considered as statistically significant.
**Results and discussion:** TThe mean patients' age was 66.3±13.1 in A and 68.4±6.7 years in B group. Baseline $rSO_2$ were not different between two groups. The maximal intraoperative rSO2 decrease on the operative side after the head reposition and/or carotid cross clamping was 37.1±15.8 in A and 23.1±11.9 in B group ($P=0.05$). The mean AUC for $rSO_2$ decrease was 143.6±186 in A and 37.6±67.5 in B group respectively ($P=0.002$). The rSO2 decreased significantly from baseline at the skin closure point in A group (72.2 vs. 65.8, $P=0.022$), and was unchanged in group B (64.9 vs. 67.1). Intraoperative shunt was placed in 3 patients in A and in 1 in B group ($P=0.592$).
**Conclusion(s):** Intraoperative high oxygen concentrations may reduce intensity of tissue hypoxic episodes during CE in TIVA. Postoperative follow up in large patient's group is necessary to confirm its impact on patients' outcome.
**References:** Hojlund J, et al. Anesthesiol Res Pract. 2012;2012:647258;
Plcton P. et. al. Anesth Analg. 2010;110(2):581-7.

## 07AP06-4

### The significance of minor increases in troponin I level (cTnI) in symptomatic and asymptomatic patients undergoing carotid endarterectomy

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**Background and Goal of Study:** Carotid endarterectomy (CEA) is a recognized technique in the treatment of carotid stenosis. Haemodynamic instability during the procedure may lead to myocardial damage, which can be measured using cardiac troponin I (cTnI). According to ESC/ESA 2014 Guidelines even small increases in cTnI in the perioperative period may reflect clinically relevant myocardial injury with worsened cardiac outcome. We conducted a comparison of postoperative cardiac damage, defined as cardiac troponin I (cTnI) elevation, with a threshold >0.01 ug/l, after carotid endarterectomy comparing patients neurologically symptomatic and asymptomatic prior to the procedure.
**Materials and methods:** This observational study included 124 consecutive patients scheduled to undergo CEA that were either symptomatic prior to CEA (n= 75) or asymptomatic (n = 49). The study was approved by the ethics committee and all patients gave written consent for participation in this study. The levels of cTnI were measured prior to the procedure, 6 hours and 18 hours after CEA in all patients. A minor increase of cTnI (>0.01 μg/l) was regarded to be significant.
Short-term mortality at 1 month and 6 months after the procedure was assessed by telephone calls, chart reviews and regular follow-ups.
**Results and discussion:** There was no statistically significant difference between the symptomatic and asymptomatic group regarding the demographic data, although the asymptomatic group suffered from ischaemic heart disease, acute MI more often than the asymptomatic group. The use of beta-blockers was also higher in the asymptomatic group. Haemodynamic and metabolic data during the operation showed no difference between the two groups and no episodes of hypotension or tachycardia were noted intraoperatively. The cTnI level prior to the procedure was normal in all patients from both groups. The cTnI level was higher in the symptomatic group 6 hours after CEA as compared to the asymptomatic group (0.03 μg/l vs 0.01 μg/l, $p=0.050$). The length of stay in the hospital and the reoperation rate showed no difference between the two groups.
The mortality rate for the whole study group was 0.8% at 30 days after CEA. At 6 months, overall death rate was higher in symptomatic group, although the difference was not clinically significant (5.63% vs 2.08%, $P<0.344$).
**Conclusion:** Minor increases in cTnI levels (>0.01 μg/l) 6 hours after CEA may be associated with increased 6-month mortality.

## 07AP06-5

### Effects of a short beta-blocker therapy on aorta remodeling in an experimental model of arterial hypertension

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**Background and Goal Study:** Our group previously proved that short intravenous beta-blocker therapy produces changes in the wall of intramyocardial arteries (decrease of wall thickness) by increasing nitric oxide bioavailability, in an experimental model of arterial hypertension ([1]). Asymmetric dimetilarginine (ADMA), inhibitor of nitric oxide synthesis, is a novel independent cardiovascular risk factor. ([2]). The goal of our study was to prove if just 48h of intravenous cardioselective beta-blocker treatment also produces regression of aorta remodelling.
**Materials and methods:** Adult male spontaneously hypertensive rats (SHRs) were randomly divided into therapy group (SHR-E, n= 6) and placebo group (SHR, n=6). Wistar Kyoto rats were used as normotensive controls (WKY n= 6). After 48 hours of intervention, ascending thoracic aorta was dissected to study vascular structure by confocal microscopy (wall thickness of media and adventitial layers). ADMA levels were also measured in all groups. Comparisons among groups were made by ANOVA test of one factor with Bonferroni's correction. $P<0.05$ was considered significant.
**Results and discussion:** media thickness was decreased in SHR-E compared to SHR ($p<0.05$). Surprisingly, no differences were observed between SHR-E and WKY ($p=1.000$). There were no changes in adventitial thickness between SHR and SHR-E. SHR displayed a significant increase in ADMA concentration compared to WKY. Moreover, ADMA significantly decreased in SHR-E compared to SHR ($p<0.05$). No statistical differences were observed between SHR-E and WKY ($p=0.17$).
**Conclusions:** a cardioselective intravenous beta-blocker therapy produces early changes in aorta wall structure after just 48h of treatment. One mechanism could be its effects on ADMA pathway.
**References:**
1. Arnalich-Montiel A, González MC, Delgado-Baeza E, Delgado-Martos MJ, Condezo-Hoyos L, Martos-Rodríguez A, Rodríguez-Rodríguez P, Quintana-Villamandos B. *Short-term esmolol improves coronary artery remodeling in spontaneously hypertensive rats through increased nitric oxide bioavailability and superoxide dismutase activity.* Biomed Res Int. 2014;2014:531087.
2. Böger RH. T*he emerging role of asymmetric dimethylarginine as a novel cardiovascular risk factor.* Cardiovasc Res. 2003; 59:824-833.
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## 07AP06-6

### Cerebral oxymetry: sensibility and specificity in awake carotid endarterectomy

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**Background and Goal of Study:** Many techniques are available for cerebral monitoring during carotid endarterectomy (CEA). However, none is superior to neurological clinical evaluation while performing the procedure under cervical plexus block (CPB). Bilateral regional cerebral oxygen saturation (rSO2) with near infrared spectroscopy (NIRS) has been used to evaluate the adequacy of cerebral flow. This study was designed to compare the performance of the INVOS-5100 cerebral oximeter and the clinical neurologic functions, in patients undergoing CEA under cervical plexus block.
**Materials and methods:** A retrospective analysis was conducted in patients scheduled for CEA from October 2014 to July 2015. Awake patients (regional anesthesia) with bilateral regional cerebrovascular oxygen saturation (rSO2) monitoring during procedure were included. rSO2 values before and after internal carotid artery (ICA) clamping were compared. A drop greater than 20%, following carotid artery clamping, was considered significant. Changes in rSO2 were compared to intraoperative patient clinical status based on anesthesia and surgeon recordings. Patients converted to general anesthesia were excluded from this study. All analysis were calculated with software SPSS version 20.0.
**Results and discussion:** A total of 38 patients were included. 5 showed a significant drop in ipsilateral rSO2 (range: 30.3-38.6%, mean: 33,4 %): 2 of them had cerebral hypoperfusion signs, while the remaining 3 had no changes in consciousness after ICA cross-clamping (false positive). 33 patients had no significant changes of rSO2 values, 27 of them had no consciousness deterioration (true negative). 6 patients had a non-significant post-clamping decline in rSO2 saturation (range: -2.9%-19.6%) but had cerebral hypoperfusion signs (false negative). In this study, a total of 8 patients had changes in counsciousness and the median drop in rSO2 was 8.8%. INVOS-5100 sensitivity was 25% and a 90% specificity in comparison to the awake testing.
**Conclusion:** Neurologic symptoms occurred with a median drop in rSO2 of 8.8% (range: -2.9%-38.6%). The usefulness of rSO2 in patients awake may be modest after ICA clamping. Cerebral monitoring with INVOS-5100 has a high negative predictive value, but low positive predictive. Neurological clinical evaluation remains the best way to monitor these patients during ICA clamping.

## 07AP06-7

### Endovascular surgery: the renal side of the story

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**Background and Goals:** The number of endovascular interventions has increased exponentially over recent years. Although less invasive than open surgery, endovascular techniques may be associated with renal impairment possibly due to the contrast used intraoperatively.
The objectives of this study were to determine the incidence contrast-induced acute kidney injury (CI-AKI) in patients undergoing vascular surgery requiring intravascular contrast, establish a relation between AKI and volume of contrast administered and find a threshold dose of contrast as a predictor of AKI.
**Materials and Methods:** In this retrospective cohort study we used data from the medical records of all adult patients submitted to vascular surgery procedures requiring intravascular contrast over one year (from May 2013 until June 2014). We excluded patients with less than 18 years, no registration of serum creatinine pre or postoperative and volume of contrast administered.
CI-AKI was defined as an increase in serum creatinine concentration by ≥0.3 mg/dl within 48 hours (KDIGO Clinical Practice Guideline).
Statistical analysis was performed with SPSS22.0® and Epi Info™ (significant level α=0.05).
**Results and discussion:** Of a total 212 patients, 180 had all the data required for inclusion in the study. The incidence of CI-AKI was 10% (n=18) [95% confidence interval (CI) =6.42-15.25].
We found higher ASA physical status scores and a high prevalence of previous renal disease in CI-AKI group (p<0,05).
In CI-AKI group an average of 154,4±131,6 ml of intravascular contrast was administered versus 74,8±46,7 ml in non-CI-AKI group, p<0,05.
A contrast volume superior to 175ml increases the risk for CI-AKI in 7.95 times (95% CI= 2,60-24, 26; p<0,001).
The possibility of CI-AKI development adjusted to previous renal disease and N-acetylcysteine administration increases 19,5 times when volumes superior to 175ml were injected
(CI95% 3,93 - 96,675; p<0,001).
With the variety of surgeries and patients with multiple comorbidities included in this study is dangerous suggest a single maximum contrast dose for the prevention of CI-AKI. More studies are needed to determinate the range of volume of contrast safe of these specific patients.
**Conclusion:** Contrast volume is an important key risk factor for CI-AKI. It should be minimized and further exposure should be delayed. It's fundamental renal function checkup following the procedure to ensure stable renal function.

## 07AP06-8

### Myocardial infarction after endovascular repair of abdominal aortic aneurysms

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**Background and Goal of Study:** The endovascular repair of abdominal aortic aneurysms (EVAR) has expanded with encouraging results, contributing to a change in the practice of vascular surgery and anaesthesia. Vascular surgery patients have many comorbidities associated with myocardial infarction (MI), frequently asymptomatic in the perioperative period. The aim of this study was to evaluate the incidence, predictors and outcomes of MI after EVAR.
**Materials and methods:** We performed a retrospective study in patients who were submitted to EVAR from 2006 to 2013. We excluded patients without sufficient data available on clinical records. Patients' demographic and perioperative data were collected. As part of a postoperative care protocol, troponin measurements were assessed in high risk or symptomatic patients and an elevation superior to 0.034 ng/ml in the first postoperative 72 hours was considered as MI. Descriptive analysis was performed and the Student-t test, Mann-Whitney U test, Fischer's exact test or Chi-square test were used. Univariate and Multivariate analysis was done using logistic binary regression with calculation of an Odds Ratio (OR) and its 95% Confidence Interval.
**Results and discussion:** A total of 98 patients were included. Incidence of MI was 5% (n=5). There were no differences regarding patients' characteristics. General anaesthesia increased the risk of MI (OR 8.5, p=0.026). Patients having MI had lower minimum values of haemoglobin or haematocrit postoperatively (10.1±1.5 vs 8.5±1.1, p=0.042 and 30.5±5.0 vs 25.5±3.7, p=0.031, respectively). Acute Kidney Injury (AKI) defined by a rise in serum creatinine of 0.3 mg/dl also increased the risk of MI (OR 24.4, p=0.006). Patients with MI had longer hospital and intensive care unit length of stay (LOS)
(p<0,001). After multivariate analysis, postoperative AKI was identified as an independent predictor of MI (Adjusted OR 24.4, p=0.006).
**Conclusions:** European Society of Cardiology Guidelines consider EVAR as an intermediate risk surgery with 1-5% expected MI as we observed. General anaesthesia increased the risk of MI. Patients with a rise in post-operative creatinine may benefit from closest monitoring.

## 07AP06-9

### Use of endoluminal antegrade selective cerebral perfusion (ASCP) in the treatment of integrated total arch replacement

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**Background and Goal of Study:** This study aims to evaluate the recent outcome of integrated total arch replacement using endoluminal ASCP as a method of brain protection. Cerebral protection is a primary concern in such surgery, since cerebral circulation exclusion is required.
Brain injury is usually due to embolic events and/or prolonged ischemia. 3 methods are currently used for brain protection: Deep Hypothermic Circulatory arrest (DHCA), Retrograde Cerebral Perfusion (RCP) and ASCP. The "safe" time of circulatory arrest (DHCA) is limited and associated with neurological deficits. RCP delivering oxygenated blood to the brain through the superior vena cava is less effective due to anatomical and physiological considerations. The main advantage of endoluminal ASCP to protect the brain is the absence of direct canulation of the arch vessels. Thus the surgeon has theoretically "unlimited time" to perform the operation, using moderate hypothermia, which enhances the recovery of pulmonary and renal function and reduces coagulation issues and time of cardiopulmonary bypass (CPB).
**Materials and methods:** From 2008 to 2013, 91 patients underwent aortic arch replacement for aneurysm (60 patients) or dissection (31 patients). Brain protection was standardized using introduction of endoluminal canulae in both carotids to insure ASCP at 28°C.
**Results and discussion:** The durations of hypothermic circulatory arrest, selective cerebral perfusion and CPB were 3, 30 and 150 minutes, respectively. In the dissecting group, 3 patients died resulting in 9.68% early mortality. Permanent neurological dysfunction developed in 2 patients (6.45%), and temporary neurological dysfunction in 2 (6.45%). 3 patients also died in the aneurysm group, resulting in 5% early mortality. Permanent neurologic dysfunction developed in 2 patients (3%), and temporary neurologic dysfunction in 1 (1.6%). The mid-term survival rate was 96.4% at 2 years. Our results confirm what was shown in larger patient population studies using the same neuroprotection strategy.
**Conclusion(s):** Integrated total arch replacement using endoluminal carotid cannulation for the ASCP yields a favorable outcome with low mortality and cerebral morbidity rates.
**References:**
Khaladj N, et al: Hypothermic circulatory arrest with selective antegrade cerebral perfusion in ascending aortic and aortic arch surgery:
a risk factor analysis for adverse outcome in 501 patients, J Thorac Cardiovasc Surg 135:908, 2008.

## 07AP06-10

### Incidence and predictors of early postoperative mortality after arterial vascular surgery - a prospective study

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**Introduction and Goal of Study:** Vascular surgery (VS) patients have many comorbidities that increase the risk of death after surgery. Vascular-Physiological and Operative Severity Score for the enUmeration of Mortality and Morbidity (V-POSSUM) is a scoring system used to predict mortality after VS. The aim of this study was to evaluate the incidence and predictors of early postoperative mortality (EPOM) after VS and compare it with V-POSSUM predicted mortality.
**Methods and material:** Observational, prospective study, approved by the institutional Ethics Committee, including patients submitted to elective arterial VS between January and April of 2015. Patients under 18 years were excluded. Patients' demographics and perioperative data were collected. Descriptive analysis was performed and the Student's-T test, Mann-Whitney, Fischer's exact test or Chi-square test were used. Univariate and multivariate logistic regression were done with calculation of an Odds Ratio (OR) and its 95% Confidence Interval. Hosmer-Lemeshow test for Goodness of fit and Area under the Receiver Operating Curve (AUROC) were also analyzed.
**Results and discussion:** We included 306 patients and EPOM was 6.2%. Expected mortality by V-POSSUM was 6.5%. No differences were found regarding the type of anaesthesia (p=0.636). Age, history of congestive heart failure (CHF), reduced functional capacity defined as MET<4, peripheral arterial disease (PAD), Chronic Kidney Failure (CKF), ASA physical status IV/V, Revised Cardiac Risk Index (RCRI) ≥2, hipocoagulation, pre-operative serum Creatinine >1.8mg/dl or serum Urea >50 mg/dl and intra-operative red blood cells (RBC) transfusion were considered predictors in univariate analyses. Post-operative myocardial infarction (MI) and acute kidney injury (AKI) increased the risk of EPOM (OR 4.8, p=0.011 and OR 5.4, p=0.001), respectively. On multivariate analyses, age (OR 1.1, p=0.005), PAD (OR 6.8, p=0.009), hipocoagulation (OR 13.8, p=0.001), pre-operative serum Urea >50 mg/dl (OR 10.1, p=0.001) and intra-operative RBC transfusion (OR 1.7, p=0.002) were considered as independent predictors of EPOM. Hosmer-Lemeshow test was 0.304 and AUROC was 0.904 compared to 0.863 of V-POSSUM.
**Conclusions:** Observed EPOM was similar to V-POSSUM predicted mortality. Post-operative MI and AKI increased the risk of EPOM. Age, PAD, hipocoagulation, pre-operative serum Urea >50 mg/dl and intraoperative RBC transfusion were found to be independent risk factors for EPOM.

## 07AP06-12

### Acute kidney injury after endovascular repair of abdominal aortic aneurysms

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**Background and Goal of Study:** Acute kidney injury (AKI) is a known complication after endovascular repair of abdominal aortic aneurysms (EVAR), increasing surgical morbidity and mortality. According to previous studies, incidence is between 18-29%.
The aim of this study was to evaluate the incidence, predictors and outcomes of AKI after EVAR and compare it with Vascular Surgery AKI Predictive Score (VSAKIPS).
**Materials and methods:** We performed a retrospective analysis of patients submitted to EVAR from 2006 to 2013 excluding patients without perioperative serum creatinine values. Patients' demographics and perioperative data were collected. AKI was defined as a rise of 0.3 mg/dl in postoperative serum creatinine. Descriptive analysis was performed and the Student's-T, Mann-Whitney, Fischer's exact or Chi-square tests were used. Univariate and multivariate logistic regression were done with calculation of an Odds Ratio (OR). Hosmer-Lemeshow test for Goodness of fit and Area under the receiver operating curve (AUROC) were also analyzed.
**Results and discussion:** We included 83 patients. Incidence of AKI was 18%. Patients with AKI had higher hospital length of stay (LOS) (5 [4-6] vs 12 [6-19] days, p<0.001) and mortality rate (p=0.031). Comorbidities were similar between the 2 groups except for preoperative hypocoagulation medication (7 vs 27%, p=0.029). Preoperative haemoglobin <10 g/dl (OR 8.25, p=0.029) and serum creatinine >1.2 mg/dl (OR 7.43, p=0.015) were considered predictors of AKI in univariate analysis as well as postoperative haemoglobin <10 g/dl (OR 22.62, p=0.003) and red blood cells transfusion (OR 7.88, p=0.013). Preoperative serum urea >50 mg/dl (OR 4.97, p=0.038), general anaesthesia (OR 9.64, p=0.002) and surgery duration[J1] (OR 1.53, p=0.043) were considered independent predictors of AKI in multivariate analysis. There was also an association between [J2] AKI and myocardial infarction (p=0.003). Hosmer-Lemeshow test was 0.239 and AUROC was 0.864 compared to 0.817 of VSAKIPS[J3] [J4] .
**Conclusions:** The incidence of AKI was consistent with previous studies. Preoperative serum urea >50 mg/dl, general anaesthesia and surgery duration were considered independent predictors of AKI. Data concerning the amount of contrast administrated in surgery was not available, which is a limitation to our study. VSAKIPS may be useful to detect patients at risk of developing post-operative AKI after EVAR.

## 07AP07-1

### Changes in platelet function during cardiac surgery between hemodialysis and non-hemodialysis patients using ROTEM

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**Background and Goal of Study:** Many patients on hemodialysis (HD) tend to decrease levels of antithrombin (AT) due to the administration of heparin as an anticoagulant.[1] Patients with low AT levels need more heparin during cardiopulmonary bypass (CPB) because of heparin resistance.[2] We compared AT, hemoglobin (Hb) and fibrinogen (Fib) levels and platelet count (Plt) and Plt function using rotation thromboelastometry (ROTEM) in patients on or not on HD.
**Material and methods:** We enrolled 81 patients scheduled for CPB and divided them into two groups: on or not on hemodialysis (HD or non-HD groups, respectively). Measurements and serial ROTEM tests (EXTEM and FIBTEM) were performed at three time points:
(1) just after starting cardio-pulmonary bypass (CPB);
(2) weaning from CPB; and
(3) upon completion of the operation.
Platelet function was calculated by subtracting the amplitude of FIBTEM from that of EXTEM. A10, A20 means the amplitude at 10 and 20 min, respectively, and MCF means maximum clotting firmness. Statistical analyses were performed using Student's t-tests and chi-square test.
**Results and discussion:** There were 10 patients in the HD group and 71 in the non-HD group. At all three time-points, AT values were lower in the HD group compared with the non-HD group. Platelet function in the HD group was lower at the beginning of CPB (A10, A20) and upon completion of the operation (A10, A20) compared with the non-HD group as well. There were no differences in Hb, Fib and Plt levels between groups, but the non-allogeneic transfusion rate in the HD group was lower than that of the non-HD group (Table).
**Conclusion:** Because of lower rates of non-allogeneic transfusion in HD patients with CPB compared with non-HD patients due to decreased platelet function, more blood products are required to avoid possible massive bleeding, particularly EXTEM minus FIBTEM A10 <30 mm.[3]
**References:**
1. Analysis of biological material (Japanese) 2009;32: 234-9
2. Perfusion 1999;14: 437-42
3. Cardiovascular Anesthesia 2015;19: 49-54

| | | HD (n=10) | Non-HD (n=71) | *p*-value |
|---|---|---|---|---|
| After starting CPB | Extem-Fibtem (A10)mm | 31 ± 7 | 35 ± 5 | 0.04* |
| | Extem-Fibtem (A20)mm | 37 ± 6 | 41 ± 5 | 0.02* |
| | Extem-Fibtem (MCF)mm | 39 ± 5 | 42 ± 7 | 0.21 |
| | Hb (g/dl) | 8.0 ± 1.4 | 8.3 ± 1.4 | 0.41 |
| | Fib (mg/dl) | 167 ± 87 | 199 ± 108 | 0.36 |
| | Plt (x104/µl) | 9.1 ± 2.8 | 12.1 ± 9.0 | 0.27 |
| | AT (mg/dl) | 47 ± 10 | 58 ± 14 | 0.01* |
| Weaning from CPB | Extem-Fibtem (A10)mm | 30 ± 8 | 34 ± 8 | 0.06 |
| | Extem-Fibtem (A20)mm | 35 ± 8 | 40 ± 6 | 0.06 |
| | Extem-Fibtem (MCF)mm | 39 ± 7 | 43 ± 6 | 0.14 |
| | Hb (g/dl) | 9.0 ± 0.7 | 9.0 ± 1.1 | 0.89 |
| | Fib (mg/dl) | 184 ± 98 | 183 ± 93 | 0.98 |
| | Plt (x104/µl) | 8.8 ± 4.1 | 10.5 ± 4.3 | 0.23 |
| | AT (mg/dl) | 47 ± 18 | 57 ± 12 | 0.01* |
| Completion of operation | Extem-Fibtem (A10)mm | 31 ± 4 | 36 ± 5 | 0.01* |
| | Extem-Fibtem (A20)mm | 37 ± 5 | 42 ± 4 | 0.02* |
| | Extem-Fibtem (MCF)mm | 40 ± 4 | 43 ± 5 | 0.08 |
| | Hb (g/dl) | 9.8 ± 1.1 | 10.2 ± 1.0 | 0.21 |
| | Fib (mg/dl) | 234 ± 83 | 261 ± 76 | 0.3 |
| | Plt (x104/µl) | 9.7 ± 4.1 | 10.4 ± 3.6 | 0.6 |
| | AT (mg/dl) | 56 ± 8 | 66 ± 12 | 0.007* |
| | Non allogeneic transfusion (%) | 10 | 33 | 0.03* |

*[Table. Comparison between HD and Non-HD group (*p<0.05)]*

## 07AP07-3

### Thromboelastometry as guidance for blood management in patients undergoing cardiac surgery

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**Background and Goal of Study:** Thromboelastometry (ROTEM®) is a viscoelastometric method for a dynamic and globally haemostasis testing in a whole blood sample.
The aim of this study was to assess the results of using thromboelastometry as guidance for blood management in cardiac surgery.
**Materials and methods:** Analytical interventional quasi-experimental comparative non-randomized prospective study with a retrospective control group. Our inclusion criteria for the 62 patients in the study were: patients who had had prior cardiac surgery, endocarditis or type A aortic dissection. Patients were allocated to control group (C group) with routine transfusion practices during surgery (n=31) or treatment group (R group) with thromboelastometrically guided transfusion algorithm during surgery (n=31).
Our main variable was allogeneic blood units transfused (red blood cells, fresh-frozen plasma and platelets). Secondary variables were ICU stay duration and postoperative adverse events.
**Results and discussion:** The 62 patients were homogenously distributed in two groups except for dyslipidemia (more frequent in R group). Statistical analysis showed lower transfusion rates of fresh-frozen plasma in R group regarding C group ($p<0.001$) as well as higher use of prothrombine complex concentrate ($p<0.05$); 16% in C group before 38% in R group. What's more fibrinogen infusion was increased in R group compared to C group with an average dose administered of 0.87gr and 0.35gr respectively ($p=0.19$). Transfusion of red blood cells was decreased during surgery with an average transfusion rate of 3.9 units in C group in comparison with 2.64 units in R group ($p=0.125$). Both last variables were not statistically significant probably due to a too small sample.
There were no differences in transfusion rates during ICU stay between both groups. In addition we found a lower rate of respiratory adverse events in R group ($p<0.05$). Regarding ICU stay duration, average stay in C group was 7.45 days compared to 5.13 in R group ($p=0.34$).
**Conclusion(s):** Based on our own experience, using thromboelastometry guidance for blood management lead to a meaningful reduction of fresh frozen plasma transfusion during surgery. This fact probably brought to the decrement in respiratory adverse events after surgery and ICU stay in our patients.

## 07AP07-4

### Single center retrospective analysis of pre-operative fibrinogen concentration and transfusional requirements in cardiac surgery patients

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**Background and Goal of Study:** Recent studies suggest an association between pre-operative fibrinogen (Fib) level and transfusional requirements in coronary artery bypass surgery patients. We examined the association between pre-operative fibrinogen levels and red blood cell (RBC) transfusion in patients submitted to off-pump coronary artery bypass graft surgery (OPCABG) in a University Hospital in Portugal.
**Materials and methods:** We assessed for inclusion a random sample of records from 40% of the patients submitted to OPCABG in 2013 in our institution, with Local Ethics Committee approval. Patients submitted to elective OPCABG without known coagulation disorders were found suitable for inclusion. Patient's pre-operative characteristics and perioperative data were collected. Chi-square and Kruskal-Wallis tests were used for nominal and continuous variables, respectively. Simple binary logistic regression was performed to identify independent variables predictive of transfusion. A *p* value of 0.05 was considered significant. Statistic analysis was performed using SPSS® 21.0.
**Results and discussion:** From the 132 medical records initially assessed, 53 were excluded due to missing data. Patients were subdivided in tertiles according to preoperative fibrinogen concentration (first tertile [Ft], 223-293

mg/dl; second tertile [St], 294-367 mg/dl; third tertile [Tt], 368-606 mg/dl).
Fib levels before surgery were 259.8 ± 20.8, 333.41 ± 20.6 and 428.73 ± 60.5 in Ft, St and Tt, respectively ($p<0.001$).
Groups also differed on age (Ft: 63.81 ± 7.7 vs St: 66.81 ± 8.6 vs Tt: 68.77 ± 11.2, $p= 0.04$) and platelet count (Ft: 212.3 ± 79.4 vs St: 333.41 ± 20.6 vs Tt: 273 ± 90.3, $p= 0.06$).
Perioperative RBCs transfusion was higher in the Tt group (Ft: 26.9% vs St: 40.7% vs Tt: 50.0%), but without statistical significance ($p= 0.23$).
Length of stay (days) was also higher in Tt (Ft: 11.2 ± 16.9 vs St: 15.11 ± 15.9 vs Tt: 17.2 ± 16.3, $p= 0.026$). Univariate analysis identified age (OR 1.1, 95% CI 1.00 to 1.12, $p= 0.028$) and female gender (OR 3.85 95% CI 1.24 to 11.89, $p= 0.019$) as independent risk factors for RBC transfusion.
**Conclusions:** We didn't find a significant association between pre-operative Fib levels and perioperative RBC transfusion in patients submitted to OPCABG in our institution. Although not statistically significant we observed a tendency for higher transfusion rates in groups with higher fibrinogen levels.

## 07AP07-5

### Management of a patient with antiphospholipid syndrome for aortic valve replacement using Hepcon HMS and ROTEM

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**Background:** Antiphospholipid syndrome (APLS) is characterized by antiphospholipid antibody (APLA) and a hypercoagulable condition[1]. APLA can affect the results of a coagulation test, such as aPTT and activated clotting time (ACT)[2]. We report a case of coagulative management during an operation of a patient with APLS, using the Hepcon Heparin Management System (HMS) Plus and thromboelastometry (ROTEM).
**Case report:** A 72-year-old woman, who underwent left nephroureterectomy 1 year previously, was diagnosed with APLS from extended APTT. She was also diagnosed with aortic stenosis because of the symptom of dyspnea. An operation for aortic valve replacement was planned. Preoperative blood tests showed the following: aPTT, 61.7 s; Hb, 10.9 mg/dl; and platelet count, $8.7\times10^{9}$/L. On admission to the operating room, the HMS and ROTEM were applied. The ACT and clotting time (CT) of EXTEM and INTEM showed an extension of 219, 327, and 324 s, respectively. During the operation, the dose of heparin was determined by a heparin measurement test with the HMS, to maintain a heparin concentration of 3 U/ml. Before starting CPB, 18,000 U of heparin was administered and ACT was 835 s. During CPB, ACT values were measured to maintain the optimal heparin concentration, resulting in >900 s at any measurement point. At the time of being separated from CPB, 100 mg of protamine was administered according to the result of heparin-protamine neutralization by the HMS. Her ACT returned to 192 s. We also applied ROTEM to diagnose the residual heparin and CT ratio of INTEM/HEPTEM was 1.6, which needed additional protamine[3]. Therefore, we administered 30 mg protamine. We re-measured the CT ratio, which returned to 1.02. Two days after the operation, the patient was discharged from the intensive care unit without any complications.
**Discussion:** There are a few reports of cardiac surgery with APLS using the HMS[1,2], but no reports of HMS and ROTEM. We found that not only the HMS, but also ROTEM, are useful for controlling management of heparin-protamine.
**References:**
1. Anesth Analg 2009; 108:1116-9
2. Pharmacotherapy 2011; 31:1221-31
3. Journal of Cardiothoracic and Vascular Anesthesia 2014; 28:1015-19
**Learning points:**
1. Heparin doses for APLS during CPB need to be determined not only by ACT, but also by a heparin dose response test by the HMS.
2. ROTEM, such as the CT ratio of INTEM/HEPTEM, is also useful for diagnosing residual heparin for the second protamine administration[3].

## 07AP07-6

### Use of hemodialysis for dabigatran clearance in a patient requiring urgent surgery. A case report

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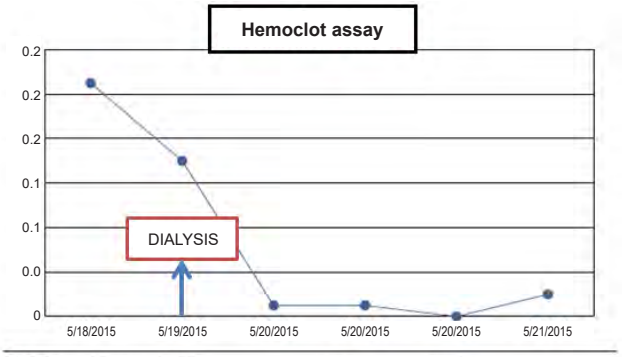
**Background:** If a patient on dabigatran treatment needs an urgent surgery, hemodialysis has been shown to be a useful tool to decrease dabigatran plasma levels due to his low plasma protein binding. To reverse dabigatran's anticoagulant effect, physicians may administer prothrombin complex concentrate (PCC) or FVIIa but their role is yet unproven. Recently a specific reversal agent, Idarucizumab is approved in USA.
**Case report:** A 71-year-old male patient, with non-valvular atrial fibrillation anticoagulated with dabigatran 110mg/12h, chronic kidney disease stage III and multivessel coronary artery disease waiting for coronary artery bypass grafting (CABG) suffered a sudden cardiac arrest. Upon admission, due to deterioration of his chronic renal failure with GFR <30ml/min and treatment with dabigatran, elongated diluted thrombin time (Hemoclot®) was detected along 7 days (Graph 1). As CAGB couldn't be delayed we performed an extended intermittent hemodialysis for 8 hours with improvement in Hemoclot® assay values (Graph 1). A slight rebound in dabigatran's concentration was observed the next day probably due to his 60-70 liters of volume of distribution but surgery was performed without bleeding complications and the patient could be discharged ten days later.
**Discussion:** The reason of persistently increased plasma levels of dabigatran in our patient was his exacerbated chronic renal failure with GFR <30 ml/min. PCC or FVIIa were discarded by the increased thrombotic risk in a patient with recent ischemia and Idarucizumab is not available in Europe.
**Reference:**
An Evaluation of Oral Dabigatran Etexilate Pharmacokinetics and Pharmacodynamics in Hemodialysis. Journal of Clinical Pharmacology2015. 54(8) 901-909
Strategies for Urgent Reversal of Target-Specific Oral Anticoagulants. Hospital Practice, 42 (5), Dec2014.
**Learning points:** Dialysis due to dabigatran's pharmacokinetic profile with low plasma protein binding is a good therapeutic option, which enables clearing plasma dabigatran concentration and improve patient's hemostasis when urgent surgery is required.




| | | | | |
|---|---|---|---|---|
| 2015-794607 | 18/05/2015 | Dabigatran | 0,21 | µg/mL |
| 2015-268970 | 19/05/2015 | Dabigatran | 0,14 | µg/mL |
| 2015-795082 | 20/05/2015 | Dabigatran | 0,01 | µg/mL |
| 2015-795151 | 20/05/2015 | Dabigatran | 0,01 | µg/mL |
| 2015-795274 | 20/05/2015 | Dabigatran | 0,00 | µg/mL |
| 2015-795441 | 21/05/2015 | Dabigatran | 0,02 | µg/mL |

*[Hemoclot assay]*

## 07AP07-7

### Detection of internal jugular vein thrombosis in cardiac surgery

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**Background and Goal of Study:** The presence of thrombi or complete thrombosis of the internal jugular vein (IJV) may be a cause of failure of venous catheterization. IJV thrombosis is a rare and an underdiagnosed condition. Its most frequent causes are: previous central venous catheterization, head and neck trauma, infection or surgery, malign diseases, other hypercoagulable states and intravenous drug abuse. It may also occur spontaneously. The goal of this study was to determine the incidence of IJV thrombosis (or presence of thrombi) in patients scheduled for cardiac surgery before central venous catheterization.
**Materials and methods:** 73 patients scheduled for cardiac surgery were included and a total of 146 IJV were explored. A trained anaesthesiologist performed an echo-Doppler of both IJV from the submandibular area to the supraclavicular fossa before venous catheterisation. All the known risk factors for IJV thrombosis were recorded. Exclusion criteria were patients with a jugular catheter in place before surgery.
**Results and discussion:** The incidence of thrombi in our sample was 2,73%. The incidence was exactly the same in the left than in the right side. Large venous valves were observed in 19,2% of cases on the right side and in 11% on the left side. None of the classic known risk factors was associated with a higher incidence of thrombi in our sample. The use of anticoagulant or antiplatelet therapy was not protective.
**Conclusion(s):** There is compelling evidence that ultrasound guided internal jugular vein catheterisation is associated with a higher success rate an fewer mechanical complications compared with traditional approach based on external anatomical landmarks. But availability of ultrasound machine in the intraoperative setting might be a problem, especially because of the realisation of simultaneous procedures in a short period of time that may require ultrasound use. Due to the incidence of IJV thrombosis and large venous valves, at least, the screening of the internal jugular veins before puncture may help to choose the right vein to catheterise avoiding failure in catheterisation and its potential complications and saving time in the intraoperative setting. We should discuss also the need of malignancy research in those cases of finding of an IJV thrombosis without apparent cause.

## 07AP07-8

### The relationship between preoperative antithrombin level and heparin dose response in hemodialysis and non-hemodialysis patients

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**Background and Goal of Study:** Many patients on hemodialysis (HD) tend to decrease levels of antithrombin (AT) due to the administration of heparin as an anticoagulant.[1] Patients with low AT levels need more heparin during cardiopulmonary bypass (CPB) because of heparin resistance.[2] We hypothesized that patients on HD have a lower heparin dose response (HDR) due to low AT levels and therefore need a higher heparin dose than patients not on HD during CPB.
**Material and methods:** We enrolled 81 patients scheduled for CPB and divided them into two groups: on or not on hemodialysis (HD or non-HD groups, respectively). We targeted activated clotting time (ACT) >400 s using Hepcon HMS® tests before and after heparin administration, and compared the groups for control and acquired ACT, heparin dose and concentration.
We also measured AT, HDR, hemoglobin (Hb), fibrinogen (Fib), platelet count (Plt) and thrombin-antithrombin complex (TAT) before anesthetic induction between groups.
Statistical analyses were performed using Student's t-tests.
**Results and discussion:** There were 10 patients in the HD group and 71 in the non-HD group. AT values were lower (80 ± 17 vs. 96 ± 18 mg/dL, p=0.008) but HDR values were higher (120 ± 43 vs. 99 ± 29 s/U/mL, p=0.04) in the HD group compared with the non-HD group (Table). HDR (s/U/mL) means an increased rate of ACT/s/per 1 unit of heparin concentration (U/mL).[3] A higher HDR represents a high sensitivity to heparin in HD patients; nevertheless, they showed low concentrations of AT. HDR values are usually influenced by not only AT level but also exogenous coagulation factors and activated platelet function.[3]
**Conclusion:** Patients on hemodialysis had low AT but high HDR levels. Therefore, our hypothesis was incorrect.
**References:**
1. Analysis of biological material (Japanese) 2009;32: 234-9
2. Perfusion 1999;14: 437-423. Anesth Analg 2010;111: 856-61

| | HD group (n=10) | Non-HD group (n=71) | P-VALUE |
|---|---|---|---|
| Control ACT (sec) | 148 ± 13 | 141 ± 17 | 0.27 |
| Acquired ACT (sec) | 425 ± 61 | 426 ± 103 | 0.97 |
| Heparin dose (U/kg) | 490 ± 19 | 430 ± 19 | 0.23 |
| Heparin concentration (U/ml) | 3.1 ± 0.7 | 3.3 ± 1.0 | 0.54 |
| AT (mg/dl) | 80 ± 17 | 96 ± 18 | 0.008* |
| HDR (s/U/ml) | 120 ± 43 | 99 ± 29 | 0.04* |
| Hb (g/dl) | 11.7 ± 2.3 | 12.0 ± 1.8 | 0.61 |
| Fib (mg/dl) | 308 ± 95 | 372 ± 114 | 0.09 |
| Plt (x10$^4$/µl) | 15.2 ± 5.3 | 17.9 ± 6.9 | 0.27 |
| TAT (ng/ml) | 11 ± 19 | 12 ± 15 | 0.85 |

*[Table. Comparison between HD and Non-HD group (*p<0.05)]*

## 07AP07-9

### Cerebral perfusion during pulsatile or non-pulsatile cardiopulmonary bypass technique in coronary artery bypass grafting surgery

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**Background and Goal of Study:** We purposed to determine the effects of pulsatile and non-pulsatile kardiopulmonary bypass tecnique on cerebral perfusion; by using the serum biochemical markers which are used in neurological disorders such as S100B protein and the Cerebral oximetry (near infrared spectroscopy) for monitoring the cerebral perfusion.
**Materials and methods:** 44 patients of 22 pulsatil, 22 nonpulsatil group, were included to the study. Two different neuropsychological tests (Standardised Mini Mental Test and Montreal Mini Mental Test) were applied to the patients preoperative and postoperatively to determine the neurocognitive dysfunctions. We recorded the NIRS values and analyzed the blood S100 B levels; preoperative (A), on pump after cross clemping of aorta (B) and removal of cross clemp on the aorta (C), at the end of the surgery (D) and 24 hours after the surgery (E). We also analysed all the arterial blood gas sampling values and the hemodinamic parametres which could have impact on cerebral perfusion.
**Results and discussion:** The avarage of mean arterial blood pressure of the second values (on pump after cross clemping of aorta) was statistically significantly greater (p <0.05) in the group 1, than the goup 2. We also compared the NIRS values which were recorded during the surgery and found that; the value of rSO2 rigt at the time of removal of cross clemp on the aorta while on pump (C), was statistically significantly greater (p <0.05) in the group 2, than the goup 1. The result of the comparison of the serum S100B levels is correlated to rSO2 values. The values of serum S100 B measurements of C and E period were C statistically significantly greater (p <0.05) in the group 2, than the goup 1. Other than these there were no statistically significant difference about the pH, lactate, glucose, pCO2, SPO2 levels and the dermografical datas in between the two groups.
**Conclusion(s):** According to all the evidences we found during this study, we can say that pulsatile perfusion may be more beneficial for cerebral perfusion however no distinctness were found in the neuropsychological tests.

## 07AP07-10

### Development of a cardiopulmonary bypass system with a drainage flow servo controlled blood pump

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**Background:** Gross air embolism is a life-threatening complication during cardiopulmonary bypass (CPB). Among multiple sources of air emboli in the current CPB apparatus, the most common cause has been inattention to the reservoir level and pumping air out of empty venous reservoir. Although use of low level alarm and automatic pump shut-off mode was recommended in Japan, cessation of pump flow itself may provide a life-threatening condition. We developed a newly conceived CPB pump system with drainage flow servo-controlled blood pump. We compared pump performance against sudden reduced venous drainage of the servo-controlled pump system with conventional CPB system by using a mock circuit made with standard CPB component.
**Methods:** A transit time ultrasonic flow meter was attached to the drainage line of the mock circuit in the conventional CPB system, in which drainage flow data was digitalized and used for servo regulation of blood pump. A low-level sensor was attached to the hard-shell reservoir and blood pump was set to stop at the level of below 200 ml. Trials of drainage flow reduction by 50 % and 75% were conducted at different flow rate (4L/min; 6L/min) and reservoir level (300mL; 400mL). Air bubble in the arterial line was monitored by air bubble detector.
**Results:** When drainage flow was reduced by 50% at flow rate of 4 and 6 L/min, the time to pump stop in the conventional CPB system were 3.6 and 3.5 sec with the reservoir level of 300mL, and 5.2 and 4.4 sec with 400mL. When reduced by 75% at 4 and 6 L/min, the time to pump stop were 3.0 and 2.4 sec with 300mL, and 4.6 and 2.8 sec with 400mL. In the servo controlled CPB system, systemic pump flow could be reduced immediately to the same as the drainage flow. As a result, blood pump did not stop in any condition and reservoir level was kept constant. Air bubble was not detected at all in the arterial line of servo-controlled pump system.
**Conclusion:** Our in vitro evaluation demonstrated the superior performance of drainage flow servo- controlled pump system with its ability of avoiding pump-shut off and preventing air embolism in comparison with a low-level alarm system. Servo-controlled pump system may improve safety of CPB management by increasing response time of surgical team in face of a sudden reduced venous drainage situation.

## 07AP07-11

### Successful surgical treatment of massive pulmonary embolism after prolonged resuscitation and extracorporeal membrane oxygenation: a case report

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**Background:** The mortality rate in massive PE is high due to the right ventricular failure and hemodynamic deterioration which could resume to cardiac arrest. We report a successful use of V-A ECMO for hemodynamic stabilization before surgical treatment of the patient with massive PE after prolonged resuscitation.
**Case report:** 44 years old man was admitted at the emergency unit after collapse. After admission CPR was initiated as cardiac arrest occurred. Circulation was restored but during the diagnostic procedure the cardiac arrest with pulses electrical activity ensued again. CPR was continued for 40 minutes. TTE showed severe right ventricular dilatation and massive PE was suspected. Patient was intubated on infusion of norepinephrine, dobutamine and epinephrine in cardiogenic shock with severe hypotension and acidosis. V-A ECMO was percutanesously established to stabilize circulation. The ultrasound of lower limb revealed thrombosis of left femoral vein. The diagnosis of massive PE of both right and left pulmonary arteries was confirmed by CT and 50 mg of Actilyse was administered. On ECMO the patient's circulations was stabilized, but still right ventricular failure was detected by TTE. The decision for surgical pulmonary embolectomy was brought. Operation was performed with median sternotomy, TEE monitoring and CPB with aortic cross-clamp. Clots were extracted under direct vision. When weaned from CPB there was still left and right ventricle dysfunction detected by TEE and ECMO was continuing postoperatively. On the 2nd postoperative day ECMO was successfully removed and at the same time cava-filter was implanted. No neurological disorders were observed when sedation was stopped, patient was weaned from ventilator and extubated. Two days later patient was discharged from ICU.
**Discussion:** Surgical embolectomy, if thrombolityc therapy is ineffective, is treatment of choice in hemodinamical unstable patient (1). Even though ECMO is frequently utilized there are not many reports about ECMO as rescue therapy in massive PE.
**Reference:**
1.Takahashi H, Okada K, Matsumori M, Kano H, Kitagawa A, Okita Y. Aggressive surgical treatment of acute pulmonary embolism with circulatory collapse. Ann Thorac Surg 2012; 94: 785-91.
**Learning points:** ECMO could be successfully used to stabilize circulation and improve the outcome after CPR because massive PE.

## 07AP07-12

### Finding of left atrial appendage (LAA) thrombus despite a normal preoperative transthoracic echocardiography (TTE). Importance of intraoperative TEE. A case report

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**Background:** TTE cannot reliably exclude left atrial (LA) thrombi prior cardiac surgery. LA trombi have been shown to be associated with an increased stroke rate. TEE has a sensitive and specificity of 100% in detection of LA and LAA thrombi in contrast to TTE which has limitations when assessing the presence of masses or thrombi in the left atrium.
**Case report:** We report the case of a 60-year-old woman scheduled for aortic and mitral replacement. Her history includes atrial fibrillation and ischemic stroke. Chronic anticoagulation was suspended five days before surgery and low molecular weight heparin began. The intraoperative TEE revealed a new 20x30 mm diameter pedunculated mass in LAA protruding to LA. Preoperative TTE had been performed 2 months before, showing any mass inside. This made the surgeon was very cautious in the left atrial opening because the possibility of thrombus embolization.
**Discussion:** According to the latest guidelines, TEE should be used in all open heart procedures in order to:
(1) confirm and refine the preoperative diagnosis,
(2) detect new or unsuspected pathology,
(3) adjust the anesthetic and surgical plan accordingly, and
(4) assess the results of surgical intervention.
Our case confirms the importance of detection of new findings prior the operation which changes the surgical procedure and planning. Thrombi appear as echogenic mass protruding into the main cavity, and are generally broad and pedunculated base, they mostly are stationary. It should make us suspect its presence whenever there are stasis phenomena such as atrial fibrillation and mitral stenosis. Thrombogenic risk increases with decreasing LAA velocities: <20 cm/s (29%) 20-40 cm/s (10%) and >40 cm/s (1%). The flow velocities in LAA as may incur indication surgery ligation. The withdrawal of the anticoagulation, can cause thrombosis in this area and therefore its substitution for HLMW is necessary although not always prevent from a new thrombus.
**References:**
Practice Guidelines for Perioperative Transesophageal Echocardiography. Anesthesiology 2010; 112:1084-96
Assessment of LAA Function by Transesophageal Echocardiography. Implications for the Development of Thrombus. Charles Pollick et al. Circulation 1991;84:223-231.
Left atrial appendage occlusion. Alli O. et al. Heart 2015;101:834-841.
**Learning points:** TEE should be used in all open heart procedures. Intraoperative TEE gives the possibility to detect new pathologies that changes the surgical procedure.

## 07AP08-1

### Impact of thoracic endovascular aortic repair (TEVAR) on renal function

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**Background and Goal of Study:** Thoracic endovascular aortic repair (TEVAR) has emerged as an attractive alternative for patients who are not considered as the ideal candidates for conventional surgery of diverse aortic pathologies. As the applicability of TEVAR is increasing, the need for risk stratification to predict a possible adverse effect on vital functions is of paramount importance. We sought to validate the application of TEVAR procedures on the basis of renal function adequacy.
**Materials and methods:** Following our institutional review board approval, a cohort of 41 candidates (36 M /5 F, aged 68.5±10.8 years, ASA-PS 2-4) scheduled for elective TEVAR procedure of the descending thoracic aorta, were prospectively enrolled in this study. For renal function assessment, serum creatinine (SCr), serum urea and estimated glomerular filtration rate (eGFR) upon admission (baseline) and hospital discharge were recorded. At the same time points serum lactate concentration was also determined as an index of lactate disposal from kidneys. Demographics, comorbidities and surgical charasteristics were also evaluated as potential contributors to renal function alterations. For statistical analysis Wilcoxon signed-rank and Fisher exact test were used.
**Results and discussion:** SCr (mg/dL), eGFR (ml/min/1.73m$^2$) and lactate (mmol/L) declined significantly from baseline to hospital discharge (1.2 ±0.8 to 1.29±0.8, p=0.000; 82.6±30 to 70±24, p=0.000;.and 1.5±0.9 to 1.8±1.2, p=0.042, respectively), while urea levels remained stable (41±15 to 43±14 mg/dL, p=0.121). Treatment with statins and single-endograft application affected eGFR in a favourable manner (p=0.000 for both). Subsets with fair eGFR (<60 ml/min/1.73m$^2$) upon admission (20%; n=8) were involved in the subgroup of patients with fair eGFR upon hospital discharge (37.5%; n=15) in an important manner (p=0.000). Demographics, comorbidities and duration of surgical procedure had no significant impact on renal function adequacy.
**Conclusion(s):** Albeit TEVAR procedures promote a notable decline in SCr and eGFR in the early postoperative period, this remains within normal or near normal range and is of limited clinical importance. Preoperative renal function insufficiency seems to predispose to this renal function deterioration, while preoperative statins medication and single-endograft application exert a beneficial effect on renal function preservation.

## 07AP08-2

### Predictors of postoperative cardiac events after open surgical repair of abdominal aortic aneurysms

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**Background and Goal of Study:** To identify predictive factors of postoperative cardiac events in our population, and to establish the clinical applicability of preoperative cardiac screening.
**Materials and methods:** Retrospective review of patients undergoing elective open surgical repair for abdominal aortic aneurysm between 2000-2014. Main end-point: 30-day cardiac events (angina, myocardial infarction, heart failure, cardiogenic shock).
**Results and discussion:** 542 patients, mean age 68.5±7 years, 96.7% men, 12.7% diabetics, 21.4% smokers. Previous ischemic heart disease was present in 135 (24.9%), with prior coronary revascularization in 82.97.2% of patients underwent preoperative cardiac screening (stress echocardiography n=446, exercise treadmill n=41, resting echocardiography n=32, SPECT-MIBI n=8), being positive in 31 (5.7%), 54.9% of them in patients without previous ischemic heart disease. Eight patients required preoperative cardiac revascularization.30-day mortality rate was 1.3% with only one death secondary to cardiac events. Postoperative cardiac events of the whole series were 6.8%, reaching 16.1% in patients with a positive preoperative cardiac screening.Independent predictors of postoperative cardiac events were: age>65 y (OR 3.4; 95% CI 1.16-10.02;p=.01), aortic diameter ≥70mm (OR 2.24; 95%CI 1.09-4.58; p=.03), diabetes (OR 2.56; 95%CI 1.11- .92; p=.03), current smokers (OR 2.13; 95%CI 1.02-4.45;p=.05) and positive cardiac screening (OR 2.82; 95%CI 1-8.21; p=.05).
The probability of postoperative cardiac events increased as follows: presence of 1 predictor 3.95%,
2 predictors 8.24%, 3 predictors 20.8%, 4 and 5 predictors 36.6%.
**Conclusion(s):** Postoperative cardiac events after aortic surgery are low in our series as well as prevalence of coronary artery disease detected by the screening protocol. Although risk subgroups have been identified, systematic cardiac screening is associated with low cardiac morbimortality rates.
**Reference:**
1. Fleisher LA, Fleischmann KE, Auerbach AD, Barnason SA, Beckman KA, Bozkurt B et al. 2014 ACC/AHA guideline on perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery: executive summary: a report of the American College of Cardiology/ American Heart Association Task Force on practice guidelines. J Nucl Cardiol. 2015 Feb;22(1):162-215.

## 07AP08-3

### Psychosocial risk factors and vascular surgery - do we need new scoring systems?

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**Introduction:** The clinical decision making process can be facilitated using different risk-scoring systems. Previous studies showed, that the number of the risk factors of the individual patients, is not entirely correlated with the estimated risk-scores of outcomes, in-hospital stays and postoperative complications. The aim of our study was to create an expanded risk-scoring system includingnot only clinical variables, but psychosocial factors as well.
**Methods:** 104 patients, undergoing vascular surgery were examined. All patients were asked to fulfill a questionnaire measuring psychosocial risk factors, meanwhile, all the intraoperative and postoperative variables were registered. The endpoints of our study were defined as short-, and long-term outcomes, postoperative complications and in-hospital mortality. For statistical analysis we used khi-square test, Spearman correlation and logistic regression.
**Results:** The most commonly appearing complications were: reoperation (7.7%), infections (6.7%) and peripheral circulatory failure (5.8%). This latter was significantly less common in men (OR=0.088). The length of ICU and in-hospital stays correlated with the operation and vasculatory occlusion times and also with the intraoperative fluid balance. We have found negative correlation between the length of ICU stay and the length of a previous hospitalization (r = -0.253). Negative emotional scales showed also negative correlation with the in-hospital stays (r = -0.216). Somatic pain negatively influenced life quality, which was followed by a longer and slower recovery time (r = 0.473). The incidence of postoperative complications increased significantly after prolonged operations (OR=1.009) and mechanical ventilation times (OR=1.223). Infections occurred more frequently after receiving massive blood transfusion intraoperatively (OR=1.421), while circulatory failure appeared increasingly in patients with lower educational levels (OR=0.384).
**Conclusions:** The role of the proven risk-increasing clinical variables is confirmed. We can also conclude, that a previously suffered hospitalization and a higher educational level, can lead to a strengthen health conscious behavior, while somatic pain causes prolonged recovery.
**Reference:**
Lee DH, Buth KJ, Martin BJ, et al. *Frail patients are at increased risk for mortality and prolonged institutional care after cardiac surgery.* Circulation 2010;121:973-8.

## 07AP08-4

### Outcomes in carotid endarterectomy in a Portuguese tertiary care hospital

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**Background and Goal of Study:** Carotid endarterectomy (CEA) is the standard treatment of carotid stenosis for symptomatic and asymptomatic patients. Indications and outcomes of CEA are based in clinical multicentric trials, where patients and hospitals included were highly selected. The purpose of the study is to describe patient's characteristics, anaesthesia and surgical techniques, including short-term outcome in our institution.
**Materials and methods:** A retrospective study was conducted in patients scheduled for CEA between October 2014-July 2015.
Data were obtained from electronic clinical charts.
Variables included: demographic data, anaesthesia and surgical technique, post operative complications, hospital stay.
Exclusion criteria: simultaneous CEA and cardiac surgery.
All analysis were calculated with SPSS 20.0. P-value<0.05 was considered to be statistically significant.
**Results and discussion:** Of 104 patients, a total of 89 patients were included, 100% ASAIII, 83% (n=74) were men, median ages of 69 [Q1 62, Q3]. 47% (n=42) of the patients were symptomatic. 93% (n=83) were submitted to deep and superficial cervical plexus block (DSCPB) and 7% (n=6) to general anaesthesia. 4 patients with DSCPB were converted to general anaesthesia, 2 for poor cooperation and 2 for changes in consciousness.
Conventional CEA was performed in 88% of the patients (76% with patch-closure technique and 12% with direct suture). Eversion CEA was performed in 12% of the patients. Surgery last a median of 118 minutes [$Q_1$ 87, $Q_3$ 130] and cross-clamp a last of 37 minutes [$Q_1$ 29; $Q_3$ 50]. In 4% carotid shunt was done.
Post operative complications: Death 2% (n=2). Neurological complications: stroke 4% (n=4), cranial nerve dysfunction 4% (n=4), intraoperative consciousness deterioration 13% (n=12). Non-neurologic complications: hypertension 38 (n=43%), myocardial infarctation 1% (n=1), pneumonia 1% (n=1), cervical hematoma 13% (n=12).
Hospital stay: Intermediate Care Unit (median 1 day, [$Q_1$ 1, $Q_3$ 1], ward 2 [$Q_1$ 1, $Q_3$ 4].
**Conclusion(s):** CEA was performed in accordance with international standards although a significant morbidity complicated this procedure occurred in our institution. A prospective study should determine risk factors of these complications.

## 07AP08-5

### The impact of intraoperative fluid management with or without colloids on adverse outcomes following vascular surgery

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**Background and Goal of the Study:** The safety and efficacy of colloid solutions have been in the focus of interest in recent years. The aim of this study was to evaluate the impact of intraoperative (IOP) fluid management with or without colloids on early postoperative (POP) outcomes following vascular surgery.
**Materials and methods:** We prospectively enrolled 104 patients undergoing various vascular surgical procedures, excluding varix surgery in a tertiary university hospital. The database was set up for a prospective study examining frailty factors in vascular and cardiac surgical population. Anamnestic, intra- and postoperative clinical data were recorded, our present analysis was made retrospectively on these data. Primary endpoints were intra- and early postoperative complications, in-hospital mortality and length of ICU and hospital stay. Spearman correlation, Mann-Whitney U-test, linear and logistic regression were performed for statistical analysis.
**Results and discussion:** The most frequent POP complications were the need for reoperation (n=8; 7.7%), infection (n=7; 6.7%) and peripheral circulatory failure (n=6; 5.8%). The median hospital stay was 6 days (IQR: 4-8); and 19 patients stayed at least one day in the ICU postoperatively. The length of hospital stay (corr. coeff.: 0.57 and 0.421) and ICU stay (corr. coeff.: 0.484 and 0.428) showed significant positive correlation with the length of surgery and clamping time, the amount of all-type fluid, crystalloid, HES, gelatine, RBC infused intraoperatively, and the IOP fluid balance. After comparing the crystalloid-only group with the group of patients also receiving colloids, significant difference was found in the length of hospital and ICU stays (median 0 vs. 0.5 and 4 vs. 8 days, respectively), the haemoglobin levels on POP day 1 and 2 (118 vs 108 and 123 vs. 94.5 g/L, respectively), and the eGFR on POP day 3 (91 vs 51.8 mL/min).
**Conclusion:** According to the above findings, qualitatively and quantitatively appropriate intraoperative fluid management has substantial impact on outcome following vascular surgery. Fluid overload and colloid solutions should be avoided as far as the clinical situation allows.

## 07AP08-6

### Propofol induces vasodilation through AMP-activated protein kinase activation in rat aortic smooth muscle

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**Background and Goal of Study:** AMP-activated protein kinase (AMPK) plays an important role in the regulation of vasomotor tone. Propofol induces vasodilation and hypotension in clinical practice. We investigated whether propofol may exert a regulatory effect for vascular tone via AMPK activation and its underlying mechanism in vascular smooth muscle cell (VSMC).
**Materials and methods:** This study was approved by the Animal Care and Use Committee of Yeungnam University. AMPK and Liver kinase B1 (LKB1) levels using western blot analysis and myosin light-chain kinase (MLCK) and phosphorylated myosin light chain (p-MLC) expression using real-time polymerase chain reaction were measured in primary VSMCs isolated from the thoracic aorta of male Sprague-Dawley rats after propofol treatment. And then we observed whether pharmacological AMPK inhibition with compound C and genetic AMPK inhibition with siRNA transfection can reverse the effect of propofol in VSMCs. Isometric tension response in aortic rings precontracted with phenylephrine was measured after propofol and then pharmacological inhibitor of AMPK, compound C, in endothelium intact and denuded rat aorta.
**Results and discussion:** Western blot analysis showed that propofol dose- and time-dependently increased phosphorylation of AMPK and its upstream kinase, LKB1 in VSMCs. LKB1 and AMPK activation by propofol inhibited MLCK and p-MLC expression in VSMCs, which were reversed with treatment of pharmacological AMPK inhibitor, compound C or genetic inhibition of AMPK using siRNA. Isometric tension study showed that propofol-induced AMPK activation attenuated phenylephrine-stimulated contraction in endothelium-denuded rat aorta.
**Conclusions:** These data demonstrate for the first time that propofol attenuates phenylephrine-stimulated contraction of rat aortic smooth muscle by inhibition of MLC phosphorylation via activation of LKB1-AMPK in VSMCs. AMPK activation may be another mechanism of propofol-induced vasodilation and hypotension in clinical practice.
**References:**
1. Horman S, Morel N, Vertommen D, Hussain N, Neumann D, Beauloye C, et al. AMP-activated protein kinase phosphorylates and desensitizes smooth muscle myosin light chain kinase. J Biol Chem 2008; 283: 18505-12.
2. Sung JY, Choi HC. Metformin-induced AMP-activated protein kinase activation regulates phenylephrine-mediated contraction of rat aorta. Biochem Biophys Res Commun 2012; 421: 599-604.

## 07AP08-7

### The effect of pulmonary static inflation with 50% Xenon on postoperative lung function in patients undergoing acute Stanford A aortic dissection surgery

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**Background and Goal of Study:** To assess the effects of pulmonary static inflation with 50% Xenon during CPB on postoperative lung function in acute Stanford A aortic dissection patients undergoing emergency surgery by observing the perioperative changes of indices of pulmonary function.
**Materials and methods:** 100 acute Stanford A aortic dissection within 2 weeks were randomly assigned to two groups, control group (n=50): pulmonary static inflation with 50% $O_2$ and 50% $N_2$,Xenon group (n=50): pulmonary static inflation with 50% $O_2$ and 50% Xenon. The pressure of pulmonary static inflation was maintain at 5 cm$H_2O$ in both group. Arterial blood gas analysis was performed after anesthesia induction($T_0$), 10min and 6 h after surgery($T_1$,$T_2$) to calculate respiratory index (RI), oxygenation index (OI), dynamic pulmonary compliance (cdyn) and static pulmonary compliance (cst) respectively.
**Results and discussion:** Compared with the baseline ($T_0$) in both groups, OI decreased and RI increased obviously. Compared with control group, the values of OI decreased less (18.8% vs 33.8%, p=0.021) and RI increased less (34.5% vs 130%, p=0.000) in Xenon group at 10 min after surgery($T_1$), there was no difference at 6 h after surgery($T_2$).
**Conclusion(s):** Pulmonary injury occur in acute Stanford A aortic dissection patients undergoing emergency surgery, pulmonary static inflation with 50% Xenon can improve pulmonary function in a short time after surgery.

## 07AP08-9

### Postoperative delirium in vascular surgery

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**Background and objectives:** Patients undergoing vascular surgery are known to be at particular risk of developing postoperative delirium (POD). The objectives of this study were to determine the incidence of POD and to identify specific perioperative risk factors possibly related to its development in patients submitted to vascular surgery. The impact of POD in hospital length of stay was also evaluated.
**Materials and methods:** 56 patients undergoing vascular surgery were included in this prospective observational study. The following data was collected: demographics, comorbidities, premedication, type of surgery, anaesthetic technique, postoperative pain scores and hospital length of stay after surgery. Patients were assessed in the postoperative period for 5 days. POD was identified using the diagnostic criteria presented in the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders and through application of the Confusion Assessment Method. Statistical analysis was performed with SPSS22.0 and Epi Info (significant level α=0.05).
**Results and discussion:** Out of 56 consecutive patients (66,43 ± 9,3 years old, 78,6% male), 7 (12,5%) developed POD (95% confidence interval = 6,19-23,62). We didn't find statistically significant associations between the demographics or any of the studied comorbidities and POD. As other studies showed, there wasn't an established association between the type of anaesthesia and the development of POD. POD incidence was 7,8% in patients premedicated with benzodiazepines versus 60,0% in those non premedicated (p = 0.011). The average length of stay in patients with POD was higher (median 21 days) than in patients without POD (median 7 days) (p=0,037). Higher postoperative pain scores weren't related to POD. 14,3% patients were admitted to the intensive care unit after surgery. Those patients weren't associated to higher rates of POD.
**Conclusion:** The incidence of POD and its significant impact in hospital length of stay are in favour of the development of tools for its early detection and treatment. Avoiding the use of benzodiazepines as premedication, contrary to what is known, increased the risk of POD in our sample. This requires further studying, even though the limited number of patients evaluated needs to be taken into account when analysing these results.

## 07AP08-10

### Mortality after endovascular repair of abdominal aortic aneurysms

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**Background and Goal of Study:** The endovascular aneurysm repair (EVAR) of abdominal aortic aneurysms has expanded with encouraging results, contributing to a change in the practice of vascular surgery and anaesthesia. Vascular surgery patients have many comorbidities that increase the risk of death after surgery. The aim of this study was to evaluate the incidence and predictors of postoperative mortality after EVAR.
**Materials and methods:** We performed a retrospective study in patients who were submitted to EVAR from 2006 to 2013. We excluded patients with insufficient data available from clinical records. Patients' demographic and perioperative data were collected. The outcome was in-hospital death. Descriptive analysis was performed and the Student-t test, Mann-Whitney U test, Fischer's exact test or Chi-square test were used. Univariate analysis was done using logistic binary regression with calculation of an Odds Ratio (OR) and its 95% Confidence Interval.
**Results and discussion:** A total of 98 patients were included. Incidence of mortality was 2%. Mortality was associated with a higher ASA classification (p=0.011), aneurysm diameter (p=0.048), lower preoperative haemoglobin (p=0.002), lower preoperative haematocrit (p=0.001), higher preoperative serum creatinine (p=0.032), higher preoperative serum urea (p=0.021), intraoperative red cell transfusion (p=0.001) and postoperative acute kidney injury (p=0.008), defined as as a rise of 0.3 mg/dl in postoperative serum creatinine. Higher preoperative serum urea increased the risk of in-hospital death (OR 1.05, p=0.022) on univariate analysis.
**Conclusions:** In our study, we found an incidence of 2% of in-hospital death after EVAR. The variables associated with mortality after EVAR were similar to those of open abdominal aortic repair.

## 07AP08-11

### Triple A Anesthesia plus rSO2 monitoring: a valid tecnique in patients undergoing carotid endarterectomy

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**Background and Goal of Study:** Patient's neurological status in CEA (carotid endarterectomy) must be immediately recognized in order to promptly evaluate if a shunt may be required.Several monitors are proposed (1,2), but the awake patient is better monitoring(3).
Both general anesthesia (GA) and local regional anesthesia (LRA) can be used (4).
We present the preliminary results of a anesthesiological technique in this kind of surgery the *Asleep Awake Asleep Anesthesia*. (AAA Anesthesia)
**Materials and methods:** We have studied 45 patients. IBP, FC, Temperature, SPO2. ETCO2, BIS and rSO2 (INVOS©) were monitored. In all patients, we used the same anesthetic technique: superficial and deep block of the cervical sympathetic, general balanced anesthesia, IOT without muscle relaxants and after local anesthesia of vocal cords. To the clamping of the carotid artery we proceeded to intraoperative awareness of patients for the awake testing and evaluate in real time the neurological status. After the test was again anesthesia depth.
**Results and discussion:** There was a complete relationship between the INVOS© track and the state of consciousness of the patient. In our initial series, we implanted a single shunt with complete recovery of neurological function of the patient .in this, the track INVOS® reported a drop in oxygenation returned to normal after shunting. Other variation of INVOS® in relation to the pressure curve are discussed. We did not have post-operative central or peripheral deficits.
**Conclusion(s):** Preliminary results of this study show that this anesthetic technique protects the patients from possible neurological complications. The patients interviewed reported no unpleasant sensations in relation to intraoperative awareness. The technique requires a thorough information as well as a thorough psychological preparation of the patients.

**References:**
1. Comparison of monitoring techniques for intraoperative cerebral ischemia. Rowed DW[1]et al.Can J Neurol. 2004
2. Intraoperative monitoring of carotid endarterectomy by transcranial motor evoked potential: a multicenter study of 600 patients Malcharek MJ et AL·Clin.Neur.2013
3. Awake craniotomy for brain tumor resection: the rule rather than the exception? Brown T[1]et Al. J Neur.Anesth. 2013
4. Regional versus general anesthesia for carotid endarterectomy Schechter MA et Al. Surgery. 2012

## 07AP08-12

### Pulmonary static inflation with 50% Xenon during cardiopulmonay bypass attenuated early postoperative inflammation in Chinese adults undergoing Stanford type-A acute aortic dissection surgery: a pilot study

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**Background:** Aortic dissection is the end stage of different pathological processes stressing on the aortic wall, which inflammation plays an important role in aortic dissection. Xenon is one of noble gases and has been recognized as an anesthetic which can exert neuroprotective and cardioprotective effects in different models by pre-, realtime- and post-conditioning.
**Objective:** To determine the effect of a pulmonary static inflation with 50% Xenon on perioperative inflammatory cytokines in patients with acute Stanford type-A dissection surgery.
**Materials and methods:**
**Design, Setting, and Participants:** A prospective signal-center clinical trial, recruited 100 adult patients undergoing Stanford type-A AAD surgery at an academic hospital in China. 100 acute Stanford type-A aortic dissection within 2 weeks were randomly assigned to two groups, control group (n=50): pulmonary static inflation with 50% $O_2$ and 50% $N_2$, Xenon group (n=50): pulmonary static inflation with 50% $O_2$ and 50% Xenon. The pressure of pulmonary static inflation was maintained at 5 $cmH_2O$ in both group.
**Main Outcome Measures:** The serum variables including inflammatory and endothelial cell function were assayed.
**Results and discussion:** There was significant effect of time and treatment-time interaction for IL-6 (P=0.000 and p=0.000, respectively), IL-10(P=0.000 and p=0.001, respectively), TNFα (P=0.012 and p=0.025, respectively) and $TXB_2$ (P=0.000 and p=0.001, respectively).
In first fraction (from beginning to postoperative 10 min), the value of IL-6, TNFα and $TXB_2$ decreased 23.5%, 9.1% and 30.2% respectively in Xenon group, but the concurrent value increased 10.8%, 26.2% and 26.4% respectively in control group. In first fraction, the value of IL-10 increased 28% in Xenon group and decreased 7.5% in control group respectively.
In the second (from postoperative 10 min to postoperative 6h) and third fractions (postoperative 6-24h), the values of IL-6, IL-10, TNFα and TXB2 changed quite similar in both groups.
Perioperative serum level of $PGI_2$ was relatively stable, with no significant differences between the groups.
**Conclusion(s):** Pulmonary static inflation with 50% Xenon during cardiopulmonay bypass could attenuate early postoperative inflammation in Chinese adults undergoing Stanford Type-A Acute Aortic Dissection Surgery.

## 07AP09-1

### Aging significantly affects baseline cerebral oxygen saturation ($ScO_2$) as measured by near-infrared spectroscopy (NIRS)

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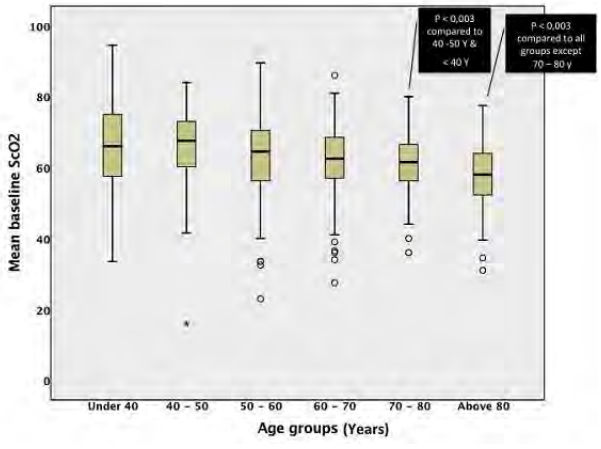
**Background and Goal of Study:** Studies in healthy aging population have shown a significant increased metabolic rate of oxygen and a concomitant decrease of cerebral blood flow (CBF) with aging.[1] This results in decreased cerebral venous oxygen saturation. The decrease in CBF is predominant in the prefrontal cortex.[1]
We hypothesize that this affects the baseline $ScO_2$ as measured by NIRS in the aging population.
**Materials and methods:** This is a subanalysis of a prospective study evaluating neurologic outcome in adult patients undergoing cardiac surgery with or without cardiopulmonary bypass(NCT02006212). Baseline right and left $ScO_2$ are recorded at room air before the induction of anesthesia(INVOS 5100). Mean $ScO_2$ is calculated from these values.
All patients had received a premedication before arrival in the operating room. Patients are divided into 6 groups in function of their age. A kruskal-Wallis test was used to compare continuous variables between the groups. A Bonferroni post hoc analysis was performed. Any pair test on a Mann Whitney test was considered significant if P <0,003. Data are expressed in median (P25 - P75). A linear regression analysis was used to predict mean $ScO_2$ with the age (years) and the preoperative Hb concentrations (g/dL) as independent variables. Multicollinearity was tested.
**Results and discussion:** In total 620 patients were analyzed. Figure1 shows the mean $ScO_2$ in function of the age group.
The left, right and mean $ScO_2$ were significantly different between the groups. As expected, the Hb concentrations of patients between 70-80 y and > 80 y were significantly lower compared with all the other groups (P <0,003). However, this difference was not the only factor explaining the reduction in mean $ScO_2$. The formula obtained by regression analysis to predict the mean $ScO_2$ was: 64,517+(0,403xHb)-(0,128xAge).
**Conclusion(s):** The physiologic changes of aging together with the significantly lower Hb concentrations affect $ScO_2$. Rather than theoretical values, baseline $ScO_2$ values should be used when defining intraoperative cerebral oxygen desaturation in the aging population.
**Reference:**
1. Hanzhang Lu, et al. Cerebral cortex 2010




*[Baseline mean ScO2 in function of age]*

## 07AP09-2

### Comparison of cardiac output measurement using LiDCOrapid™ and pulmonary artery catheters in an Asian population

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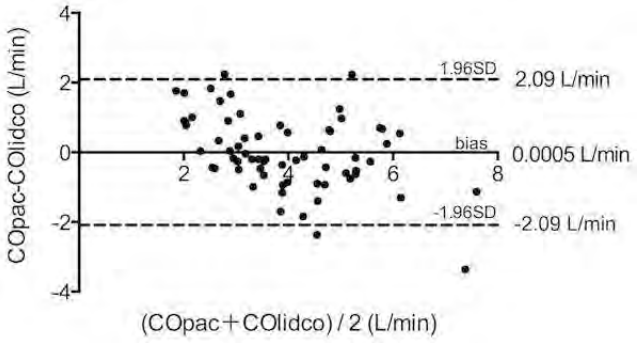
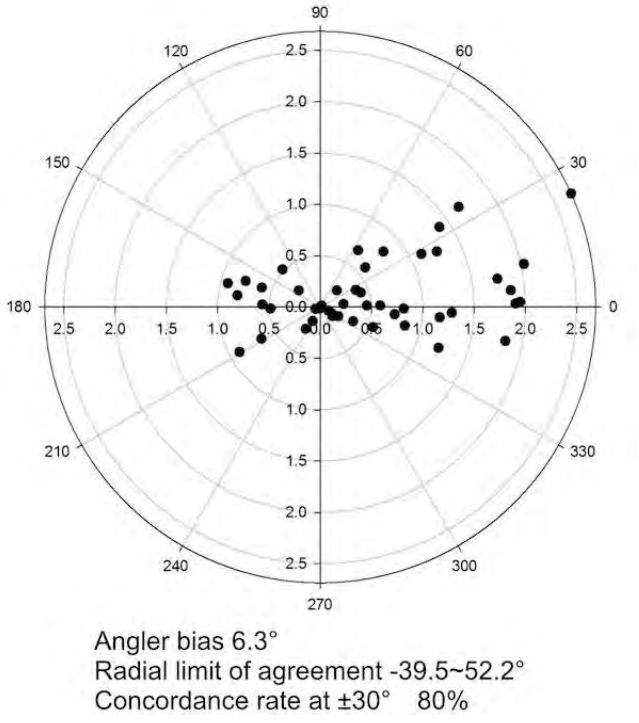
**Background and Goal of Study:** LiDCOrapid™ is an uncalibrated device for calculating cardiac output (CO). The LiDCOrapid™ nomogram uses autopsy data of aortic volume and compliance obtained from studies conducted in Western countries. The accuracy of LiDCOrapid™ in an Asian population has not been elucidated. In the present study, we compared CO measured by LiDCOrapid™ ($CO_{lidco}$) with that measured by pulmonary artery catheters ($CO_{pac}$) in Japanese patients undergoing cardiac surgery.
**Materials and methods:** After IRB approval in our institutional ethics committee, 18 patients scheduled to undergo elective cardiac surgery including off-pump coronary artery bypass grafting and valve surgery were included in this study. $CO_{pac}$ calculated by the conventional thermodilution technique with a pulmonary artery catheter and $CO_{lidco}$ were recorded at predefined points during anesthesia: just after induction of anesthesia, median sternotomy, weaning from cardiopulmonary bypass in valve surgery and after sternal closure. Values were compared by Bland-Altman analysis. Four-quadrant plots and polar plot methodology were used to evaluate CO trending ability.




*[Figure 1]*




*[Figure 2]*

**Results and discussion:** Bland-Altman analysis revealed a mean CO bias of 0.0005 L/min, 95% limits of agreement of ±2.09 L/min and percentage error of 54.0% (Figure 1). Four-quadrant plots showed an acceptable concordance rate of 90.9%. However, polar plots showed poor concordance with angular bias of 6.3°, radial limits of agreement of −39.5°~52.2° and concordance rate at ±30° of 80.0% (Figure 2).
**Conclusion(s):** The present study revealed a discrepancy in measurements of CO by LiDCOrapid™ and a pulmonary artery catheter in an Asian population. To improve the accuracy of LiDCOrapid™ in Asian populations, a specific nomogram that is based on clinical studies in Asian patients is required.

## 07AP09-3

### Comparison of two continuous cardiac output monitoring devices (esCCO versus Volume View) in patients undergoing cardiac surgery

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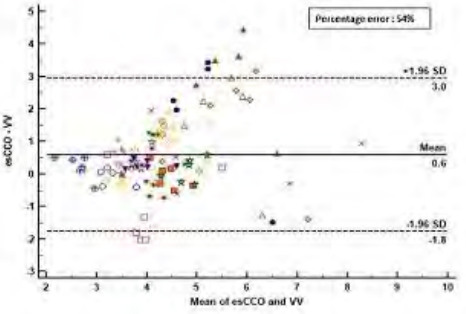
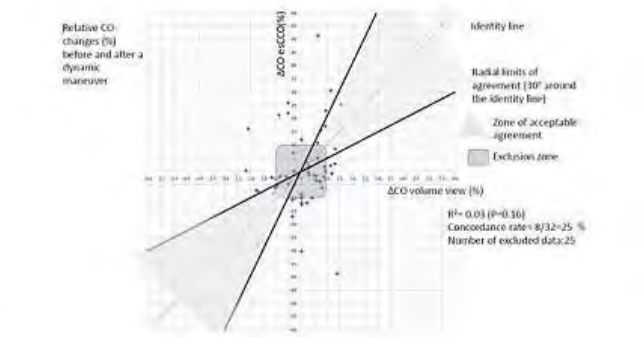
**Background:** Several recent non-invasive cardiac output monitors are attractive with their "plug and play" approach, such as the estimated cardiac output monitor (esCCO™, Nihon Kohden, Tokyo, Japan). The purpose of this pilot study was to compare CO measured by the esCCO to the Volume view (VV) (Edwards Lifesciences, Irvine, USA) and to assess their trending ability in patients undergoing cardiac surgery.
**Materials and methods:** After IRB approval and written informed consent, 19 patients were included. Before CPB, CO was measured simultaneously using the esCCO and the volume view before and after 3 maneuvers (PLR, end expiratory occlusion test and a PEEP at 10 $cmH_2O$). Five and three CO values for esCCO and VV respectively were averaged and compared during a one minute period of time before and after each maneuver. The precision error and its 95% CI that corresponds to the least significant change (LSC) were calculated within this period of time.
The Bland-Altman analysis was used to compare bias, precision and LOA of both devices. Trending ability of CO changes were assessed by the coefficient of determination $R^2$, and the 4 quadrant plot analysis [1].
**Results and discussion:** A total of 114 paired readings were collected. Median CO were 4.34 L/min (IR: 3.8; 5.2) & 3.78 L/min (IR: 3.5; 4.5) for esCCO and VV. The precision error was 1.37% (CI 95: 1.04-1.69) for the esCCO & 2.22% (CI 95: 1.75-2.70) for the VV. The Bland and Altman analysis corrected for repeated measures is shown in Fig 1




*[Fig 1: Bland-Altman plot of bias and precision: bias of 0.6 L/min and limits of agreement of ± 2.4 L/min, with a percentage error [(1.96 x SD)/mean CO of both methods] of 54%]*

CO trending analysis is depicted in Fig 2




*[Fig 2: Four quadrant concordance analysis between the percentage changes in CO measured by the volume view and the esCCO device]*

As the precision error is excellent (the LSC <5%), the differences of CO measurements between both devices cannot be explained by an intrinsic variability of each device but by different technologies to calculate CO.
**Conclusion:** The esCCO monitor was not clinically acceptable and is not interchangeable with the VV to monitor and track changes of CO.

## 07AP09-4

### Is it possible to use transpulmonary thermodilution as well as a pulmonary artery catheter to measure cardiac output in ventricular assit devices? An experimental study in porcine model

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**Background and Goal of Study:** Information about cardiac output is essential for optimal treatment of critically ill patients requirig ventricular assist device (VAD). However, so far today, there has been no studies showing the effectiveness of transpulmonary thermodilution (PiCCO) in patients with VAD implanted. The aim of this study was to evaluate the impact of left ventricular assist device (VAD) on the comparison of simultaneous measurements of cardiac output via pulmonary arterial catheter and transpulmonary thermodilution.
**Materials and methods:** Data were derived from 6 anesthetized and normoventilated minipigs. A thermodilution catheter was inserted into the pulmonary artery, and a PiCCO catheter into the left femoral artery. A VAD was then implanted, the inflow cannula had been connected to the apex of the left ventricle and the outflow cannula anasthomosed to the ascending Aorta. Once the VAD had been implanted, measurements of cardiac output and cardiac index were performed with both devices. All data were expressed as mean ± SEM. Pearson product-moment correlation coefficient was used to analyse the samples. $P<0.05$ was considered statistically significant.
**Results and discussion:** A total of 24 cardiac output measurements were performed. A correlation was found between cardiac index measurement via pulmonary arterial catheter and transpulmonary thermodilution ($r = 0.802$, $P < 0.001$) during VAD. The cardiac index by pulmonary arterial thermodilution was 3,57±0,33 l/min/m2 and by transpulmonary thermodilution was 3,79±0,43 l/min/m2.
**Conclusion(s):** Transpulmonary thermodilution could be suitable for cardiac output measurement in VAD. Transpulmonary thermodilution is a less-invasive method than traditional pulmonary arterial thermodilution

## 07AP09-5

### Measurement of cardiac output in coronary artery bypass grafting *FloTrac/Vigileo™ vs Aortic Doppler*

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**Background and Goal of Study:** Intraoperative hemodynamic optimization based on cardiac output (CO) monitoring may improve outcome of high-risk patients undergoing major surgery. The FloTrac/Vigileo™ (FTV) is a device that allows continuous CO determination and that has gained popularity in the last few years for monitoring high-risk patients in the intraoperative setting. The fact that it doesn't requires previous calibration can be an advantage but previous studies showed that it may be a drawback in some clinical settings. The goal of this study was to evaluate the agreement between CO measured by FTV system ($CO^{FT}$) and CO measured by aortic Doppler flow ($CO^{AD}$) using transesophageal echocardiography (TEE) in patients undergoing coronary artery bypass grafting.
**Materials and methods:** 30 patients were enrolled. Exclusion criteria were: cardiac rhythm disturbances, aortic valve disease, known subclavian artery stenosis or contraindication for TEE use. CO measurements were simultaneously collected at different times of surgery. Bland-Altman analysis was used to compare $CO^{FT}$ (software 4.0) with $CO^{AD}$ measurements.
**Results and discussion:** A total of 190 pairs of CO measures were analysed. Bias was -0,47 litre $min^{-1}$,(95% IC ±2,03) precision was 0,87 ± 0,73 litre $min^{-1}$ and percentage of error was 48%.
**Conclusion(s):** Despite the upgraded algorithm, the CO measured by the FTV device still showed a high percentage of error compared with CO measured by aortic Doppler flow using TEE in patients undergoing coronary artery bypass grafting.

## 07AP09-6

### Multichannel near-infrared spectroscopy monitoring during cardiac surgery

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**Background and Goal of Study:** Near-infrared spectroscopy (NIRS) monitoring of frontal cerebral tissue oxygen saturation is a useful monitoring tool for cardiac surgery. Restricted spatial resolution however is a major limitation of commercially available two-channel NIRS devices. Aim of the study was to show feasibility of multichannel NIRS measurements in the cardiac operation room.
**Patients and methods:** With IRB approval, 16 pairs of transmitters and receivers were mounted in a whole-head fiber holder of the FOIRE-3000 CW-NIRS system (Shimadzu, Japan), using an optode montage with 21 channels at 30mm source-detector (SD) separation and 38 channels at 42mm SD separation, allowing to cover parts of the middle and anterior cerebral artery territories. Measurements were continuously displayed on a computer screen and stored electronically. After surgery, temporo-spatial maps and animated topographical video sequences were generated.
**Results and discussion:** Multichannel-NIRS readings (record time 100 to 180 minutes) of four patients (coronary artery bypass grafting, n=2; aortic valve replacement, n=1; hemiarch replacement, n=1) were technically uneventful. Movement artefacts could easily be identified. Cerebral deoxygenation was reliably detected in all channels for events with global compromise of cerebral perfusion (e.g.; haemodilution, hypothermic circulatory arrest). One episode of focal hypoperfusion with right-sided focal cortical deoxygenation during hypothermic antegrade cerebral perfusion was missed by the classical frontal channels, was however readily detected by ipsilateral temporal channels of the multichannel NIRS system. Beside light and rapidly reversible cutaneous impressions, no adverse events were monitored.
**Conclusion:** Multichannel NIRS monitoring of cerebral oxygen saturation in the cardiac theatre is feasible. Signal quality is stable. Artefacts are easily identified. Focal events are potentially missed by classical bifrontal NIRS channels, however readily detected by the multichannel system. Cerebral

oxygen saturation can be continuously displayed as a topographical cortical map on a screen, allowing for rapid recognition of temporo-spatial deoxygenation during surgery. Further studies are needed to assess diagnostic accuracy of multichannel NIRS monitoring during cardiac surgery.

**Reference:**

1. Monitoring cerebral oxygenation during balloon occlusion with multichannel NIRS. Journal of Cerebral Blood Flow & Metabolism 2013;(Dec):1-10.

## 07AP09-7

### Peripheral four-wavelength near-infrared spectroscopy measurement: a comparison between EQUANOX and O3 in cardiac surgery

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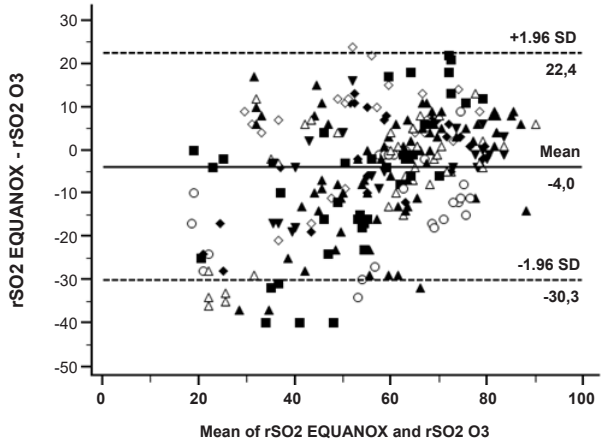
**Background and Goal of Study:** Near-infrared spectroscopy (NIRS) is a continuous and non-invasive technology that measures regional tissue oxygen saturation ($rSO_2$). Whatever the anatomical site of measurement, a normal value of $rSO_2$ would suggest a good adequacy between oxygen supply and consumption at the regional level. Beside the trend ability of previous 2 or 3-wavelength devices, a new 4-wavelength generation of NIRS monitors which could reliably assess real-time absolute values of $rSO_2$ is now available. We aimed to compare peripheral absolute $rSO_2$ values given by the 4-wavelength EQUANOX device 7600 (Nonin Medical, Plymouth, Mn) and the new O3 device (Masimo, Irvine, CA) during conventional cardiac surgery.

**Materials and methods:** After institutional approval was obtained from the local Ethical Committee (Ref. QH 10/2015), we prospectively included 20 caucasian adult patients scheduled for conventional elective cardiac surgery with cardiopulmonary bypass over a 4-month period in the Teaching University Hospital Louis Pradel (Lyon, France). For each patient, 2 NIRS sensors (EQUANOX Advance 8004CA and O3 Sensor MasimoSET) were placed over the medial part of the skeletal muscle of the right forearm. Thirteen couples of measurements were performed at predefined intraoperative time points. Variables are expressed as median (95% confidence interval). The correlation between absolute values of $rSO_2$ was determined by the Spearman correlation coefficient rho. Bland-Altman analysis was used to assess the bias and limits of agreement. $P<0.05$ was considered statistically significant.

**Results:** We compared 260 couples of absolute intraoperative $rSO_2$ values. No significant difference was found between both monitors: EQUANOX $rSO_2$ 60% (57-62) vs. O3 $rSO_2$ 62% (61-64), $P=0.103$. A significant correlation was evidenced between EQUANOX $rSO_2$ and O3 $rSO_2$ absolute values: rho=0.758 (0.701-0.806), $P<0.0001$. Bias was 4.0% and limits of agreement were ± 26.3%.

**Conclusion:** While absolute values of $rSO_2$ given by both devices were equivalent and well correlated, the clinical agreement is probably not acceptable, meaning that EQUANOX and O3 are not interchangeable in routine practice.




*[Bland-Altman analysis for repeated measurements]*

## 07AP09-8

### Haemodynamic monitoring with ECOM in elective off-pump coronary artery bypass grafting: a case-control study

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**Background and Goal of Study:** Perioperative haemodynamic optimization decreases morbidity and hospital length of stay following cardiac surgery. Off-pump coronary artery bypass grafting (OPCAB) is a simplified procedure which could accelerate postoperative recovery and limit admission to the intensive care unit (ICU). The Endotracheal Cardiac Output Monitor (ECOM) provides continuous cardiac output measurement *via* endotracheal bioimpedance in conjunction with an arterial catheter.

We aimed to demonstrate that ECOM could improve haemodynamic management and shorten recovery following OPCAB surgery.

**Materials and methods:** We prospectively included 20 consecutive adult patients scheduled for elective OPCAB in the Teaching University Hospital Louis Pradel (Lyon, France) and receiving hemodynamic monitoring with ECOM (ECOM group). These patients were compared to a retrospective cohort of 42 adult patients scheduled for elective OPCAB and not receiving hemodynamic monitoring with ECOM (Control group).

The primary endpoint was the rate of postoperative admission to the ICU. Secondary outcomes included the time to extubation, the length of stay in ICU, vasopressor requirements, and postoperative measurements of serum troponin and lactate concentration. We also assessed the feasibility of ECOM monitoring in that setting.

**Results and discussion:** The rate of postoperative admission to the ICU was 38/42 (90%) in the Control group *vs.* 11/20 (55%) in the ECOM group, $P=0.008$ (Table 1). None unexpected admission for hemodynamic instability was observed in the ECOM group *vs.* 12 in the Control group. All secondary outcomes are reported in Table 1. On a scale ranging from 0 to 5, the easiness of ECOM use and the degree of physicians' satisfaction were 4.30 ± 1.17 and 3.45 ± 0.68, respectively.

| | Control (n=42) | ECOM (n=20) | P value |
|---|---|---|---|
| Admission to the ICU | 38 | 11 | 0.008 |
| Expected | 24 | 10 | |
| Unexpected | 14 | 1 | |
| Extubation time (h) | 4 [0-696] | 2 [0-7] | <0.001 |
| Length of stay in ICU (days) | 1.0 [0 - 29] | 0.5 [0 - 10] | 0.002 |
| Vasopressor requirement | 27 | 19 | 0.012 |
| Troponin at admission (ng/ml) | 944 [265-1518] | 546 [0-275] | 0.028 |
| Lactate at H6 (mmol/l) | 2.0 ± 0.6 | 1.5 ± 0.4 | 0.043 |

*[Table 1: Outcomes]*

**Conclusion:** The systematic use of ECOM in OPCAB surgery is associated with a significant reduction in the rate of admission to the ICU and lower time to extubation and length of stay, suggesting an increase in haemodynamic optimization.

## 07AP09-9

### Non-invasive cerebral oxygenation might reflect global perfusion and hemodynamic conditions

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**Background:** Transcatheter aortic valve implantation emerged as minimally invasive treatment for aortic stenosis in high surgical risk patients. Near-infrared spectroscopy is used for noninvasive monitoring of cerebral oxygenation and may reflect global perfusion and hemodynamic conditions in critical patients.[1]

**Case report:** 68 years old woman, medical past of valvular aorta stenosis, poor ventricular function and renal chronic disease was admitted at intensive care with cardiogenic shock. Patient transesophageal echocardiography confirmed progression of the aorta stenosis (LV/AO gradient 79/49), LVEF 23% and thrombus on left ventricle. Aortic valve replacement was proposed but

due to EUROSCORE II 34 was refused. Patient was submitted to life-saving percutaneous aortic balloon valvuloplasty, despite contraindications. Owing to the improvement on hemodynamics and echocardiographic (LV/AO gradient 40/13) it was decided to proceed urgently to TAVI with a filter in aortic arch and transesophageal echocardiography. Intervention was performed under general anesthesia with traqueal intubation. Monitoring was held with ASA standard, invasive arterial pressure, BIS® and bihemispherical NIRS (INVOS®). Initial NIRS (left/right hemisphere) was 15/14, blood pressure 112/72mmHg and saturation 95%. In order to achieve the endpoint of 60% on cerebral oximetry, regardless hemodynamic and respiratory values, vasopressor/inotropic was started and adjustments on ventilator parameters were made. During the implantation of valve Edwards Sapiens 3® 26mm, hemodynamic stability was reported with surprisingly good recover after rapid ventricular pacing and a remarkable enhancement of more than 250% of the baseline of NIRS. At discharge 11 days after, patient was on class I/IV NYHA without major neurologic deficits.

**Discussion:** Tissue hypoxia occurs frequently in the perioperative setting. Therapy to optimize oxygenation should be directed to specific goals.

**Reference:**

1. Paarmanna H. et al. Noninvasive cerebral oxygenation reflects mixed venous oxygen saturation during the varying haemodynamic conditions in patients undergoing transapical transcatheter aortic valve implantation. Interact CardioVasc Thorac Surg 14 (2012) 268-272

**Learning points:** NIRS provides real-time information about regional cerebral oxygenation and it enables monitoring of therapeutic interventions. Regional saturation of $O_2$ can reflect the cardiopulmonary function despite cerebral autoregulation mechanisms.

## 07AP09-10

### Postoperative annular dynamics assessed with RT3D-Transesophageal Echocardiography after mitral valve repair: comparison between two semi-rigid mitral annuloplasty devices

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**Objective:** To study the effect of annuloplasty ring type on mitral annular dynamics after mitral valve repair.

**Methods:** Two semi-rigid ring devices (CE-PHYSIO II and Sorin-MEMO 3D) were randomly assigned to 22 patients for mitral valve repair of degenerative or functional mitral insufficiency. The median ring size was 34 for PHYSIO II and 32 for MEMO 3D ($p=0.19$) in degenerative (10 versus 7 pts) and functional (1 versus 4 pts)mitral valve disease ($p=0.13$). Mitral annular dynamics were assessed intra-operatively with transesophageal 3D-echocardiography.

**Results:** Mitral valve repair was effective with reduction of MI grade 3 to grade 0-1 in all patients, regardless of the used ring. Mean mitral gradients after repair were comparable (PHYSIO II: 4.06 ± 1.52 versus MEMO 3D: 3.40 ± 0.84 mmHg, $p=0.22$). The annular dimensions were larger both at end-systole and end-diastole in the PHYSIO II group, resulting in a larger annular orifice area (end-systole: 598 ± 104 $mm^2$ for PHYSIO II versus 488 ± 105 $mm^2$ for MEMO 3D, $p=0.03$, and end-diastole: 623 ± 113 $mm^2$ for PHYSIO II versus 512 ± 109 $mm^2$ for MEMO 3D, $p<0.01$). The annular height-to-commissural width ratio was higher for PHYSIO II at end-systole ($p<0.01$) and end-diastole ($p<0.01$). The diastolic-to-systolic annular change was only significantly different for the antero-posterior reduction rate after use of MEMO 3D (3.6 ± 2.1 % versus 1.5 ± 0.8 %, $p=0.03$).

**Conclusion:** The design of the PHYSIO II ring allows better restoration of the saddle-shape of the mitral annulus, while offering a larger effective orifice area. Conversely, the MEMO 3D device seems to preserve more the antero-posterior motion dynamics. However, it remains questionable whether these intrinsic differences are relevant for long-term mitral repair durability.

## 07AP09-11

### 3D transesophageal echocardiography as diagnostic tool in mechanical mitral valve prosthesis dysfunction during the intraoperative period

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**Background:** Intraoperative use of echocardiography can often dramatically influence a patient's management during cardiac surgery. Transesophageal echocardiography (TEE) is a valuable adjunct in the intraoperative assessment of heart valve surgery for adults patients without contraindications, and should be used in all valvular procedures to confirm the normal valve motion, proper seating of the prosthesis within the native valve annulus, and normal blood flow pattern through the valve[1].

Three-dimensional transesophageal echocardiography (3D TEE) has made it possible to obtain images in real time, without the need for off-line reconstruction[2] and has become an essential tool for intraoperative assessment in cardiac surgery.

**Case report:** We present a case of a 62 years- old man who received mitral mechanical valve replacement with a On-X 25 mm valve placed on anti-anatomic position because a severe mitral insufficiency . In 2005 he had an acute miocardial infarction complicated with a septal ventricular rupture, and underwent closure with two amplatzers.

After mechanical valve implantation and during weaning from cardiopulmonay bypass (CPB) the two-dimensional (2D) TEE showed a mild transvalvular mitral insufficiency with apparently correct movement of the two valve hemidiscs, but the 3D images shown an incomplete closure of the inferior hemidisc in systole due to an interposition of a ventricular amplatzer between the inferior hemi-disc and the closure plane of the valve.

The problem could be solved by re-entry in CPB and rotation of the valve to an anatomic position.

**Discussion:** This case is an example that we ought to be attentive to the possibility of an early valve malfunction and be able to recognize this potential life-threatening complication by echocardiography. 3D TEE is an essential tool for the assessment of the dysfunction of a prothesic valve, and can make an estructural diagnosis with more precision than 2D images. Anesthesiologist should integrate this new skills in their current practice during the TEE exam in the context of cardiac surgery.

**References:**

1. Albert, C. (2008). A practical approach to Transesophageal Echocardiography. Philadelphia, PA: Lippincott Williams & Wilkins.
2. Solis, J. Three-Dimensional Echocardiography. New Possibilities in Mitral Valve Assessment. Rev Esp Cardiol. 2009;62:188-98.

**Learning points:** 3D images improves the quality of the 2D TEE exam and should be considered in all heart valve procedures.

## 07AP09-12

### Pacing and electromyography: influence in bispectral index

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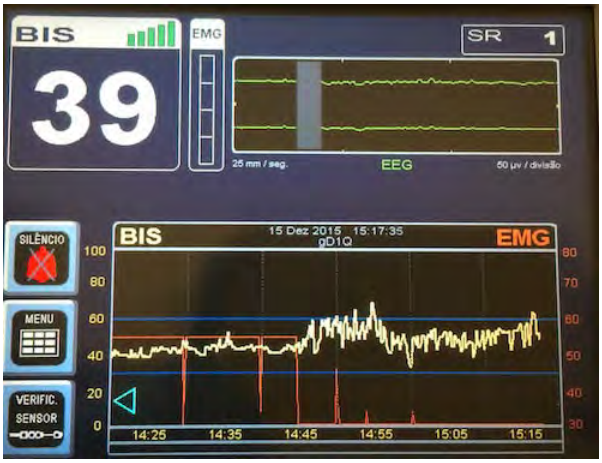
**Background:** Anesthetic depth monitoring is increasingly used nowadays has a mean to reduce awareness, an event frequently described in patients who undergo cardiac surgery. Nonetheless several caveats have been described, which must be considered when relying on processed EEG monitors.

**Case report:** Male, 82 year old patient, scheduled to mitral valve replacement and tricuspid annuloplasty. Implanted pacemaker (PM) (VVI).Intraoperative monitoring included processed EEG (BIS, Medtronic), with the goal set in maintaining values between 40-60. Transcutaneous pacing eletrodes placed pre-operatively, set to fixed rate (180 bpm) during aortic clamping in order to avoid transvenous pace response to sensing. During the procedure noted notably fixed high values in electromyography (EMG) bar, irrespective of neuromuscular relaxant administration. Anesthesia maintenance relied on clinical evaluation throughout the procedure, though BIS values maintained stable and consistent with adequate depth. Electromiography signal turned consistent with clinical evaluation after deactivation of external pace generator.




*[BIS3]*

Ofter the procedure definitive PM interrogated and reprogrammed. Surgical procedure occurred without complications.

**Discussion:** Described advantages of Bispectral index in cardiac surgery include potentially reducing the incidence of awareness and more appropriate anesthetic dosing, potentially improving recovery times and preventing anesthetic overdose and reducing hemodynamic instability (1). Though, potential interference from multiple sources have been described and include anesthetic agents, clinical conditions, abnormal EEG patterns, neuromuscular blocking agents and electrical interference. Regarding the last one, atrial pacing is said to lead to an increase of BIS value reading(2). We observed an apparent interference with electromyography recording,that didn't seemed to modify BIS value, which remained stable.

**References:**

1. Barry A. et al. Anesth Analg 2015;120:749-769;
2. Anesth Analg 2005; 101:765-773.

**Learning points:** Processed EEG is important monitoring tool. However limitations and potencial confounders must be kept in mind, and never substitute clinical judgement.

## 07AP10-1

### Reduced length of hospital stay for mini-invasive aortic valve replacements after implementation of an enhanced recovery after surgery pathway: preliminary results

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**Background and Goal of Study:** There is presently a warm enthusiasm for enhanced recovery after surgery (ERAS) program. A recent review indicates that length of hospital stay and postoperative complication could be reduced by 30 and 50%, respectively[1]. However, most of the studies analyzed encompassed solely colorectal and orthopedic surgeries. Only one retrospective ERAS program has been described for mini-invasive cardiac surgery[2]. Thus, in an effort to provide more evidence to the literature we have investigated prospectively the feasibility and clinical effectiveness of a dedicated ERAS program for mini-invasive Aortic Valve Replacements (AVR).

**Materials and methods:** Data were collected prospectively from consecutive patients scheduled for an AVR via a ministernotomy during 2 time periods, before (PRE-*AVRERAS group)* and after application of a dedicated ERAS pathway specifically designed for this mini-invasive cardiac procedure (*AVRERAS group)*. Table 1 illustrates this ERAS protocol.

| Preoperative | Intraoperative | Postoperative |
|---|---|---|
| 1. Counseling<br>1.Video projection describing the perioperative pathway<br>2. Meeting with a nutritionist<br>1. Albumin & prealbumin dosages<br>2. Metabolic state optimization<br>3. Meeting with a physiotherapist<br>1. Education on:<br>1. Incentive spirometer exercise<br>2. Secured coughing exercise<br>2. No premedication<br>1. Only pregabalin the night before the surgery and 1 hour before the surgery was allowed | 3. Mini invasive surgery<br>1. Mini-sternotomy<br>2. Mini-extracorporeal circulation<br>4. Ventilation<br>1. Protective lung ventilation 6ml.kg-1 + PEEP 5 cmH2O<br>2. During cardiopulmonary bypass<br>5. Goal Direct Therapy<br>3. TEE guidance for fluid administration<br>6. Transfusion<br>1. During bypass only if haemoglobin ≦ 7.5 g/dl<br>7. Multimodal analgesia<br>1. Acetaminophen<br>2. Ketamine<br>3. Magnesium<br>4. Nefopam<br>5. Profenid<br>6. Morphine<br>7. Wound infiltration with ropivacaine (20cc-0.75%)<br>8. Extubation in the OR | 9. Nutrition<br>Meal and drink allowed 6 hours after the surgery<br>(Postoperative Day 0: **POD-0**)<br>10. Early mobilization<br>**POD-0** on a chair with physiotherapist and incentive spirometer exercises<br>**From POD-1:** Ambulation walking test when all tubes are removed and incentive spirometer exercises<br>**From POD-3:** incentive spirometer exercises and initiation of climbing flight of stairs<br>11.Early tubes removal<br>1. Urinary catheter<br>→ when discharged from ICU<br>2. Chest tubes<br>→When less than 100ml of blood in 8 hrs no routine chest X-ray after removal<br>3. Central venous line<br>→ when discharged from ICU |

*[Table1. ERAS program for mini-invasive Aortic Valve Surgery]*

Postoperative morphine consumption, postoperative data of interest, postoperative infection rates, hospital readmission rates were collected.

**Results and discussion:** There were 22 patients in the PRE-AVRERAS group and 14 in the AVRERAS group. The median length of hospital stays were 10 and 7.5 days in the PRE-AVRERAS group and in the AVRERAS group, respectively (P = 0.05). The results of postoperative interest are described in table 1.

| Postoperative data of interest | PRE-AVRERAS (n=22) | AVRERAS (n=14) | P-Value |
|---|---|---|---|
| Postoperative morphine consumption | 8±10 | 3±3 | 0.079 |
| Mobilization on a chair on the day of the surgery; n(%) | 0(0) | 11(79) | <0.001 |
| Nutrition on the day of the surgery; n(%) | 0(0) | 10(71) | <0.001 |
| Transurethral catheter removal on the morning after surgery; n(%) | 1(4.5) | 9(64) | <0.001 |
| Overall infections during the hospitalization; n(%) | 8(36) | 1(7) | 0.062 |
| Hospital readmission for cardiac reasons; n(%) | 2(9) | 0(0) | 0.511 |

*[Postoperative data of interest]*

An ERAS pathway envisioned for mini-invasive AVR seems feasible and associated with a shorter length of hospital stay.

**Conclusion:** Our study indicates that an ERAS pathway could be implemented with interesting results when a mini-invasive AVR is planned.

**References:**

1. Varandhan clin nut 2010
2. Zaouter JCVA 2015

## 07AP10-2

### Robotic propofol sedation integrating a decision support system specifically designed for patients undergoing a transcatheter aortic valve implantation

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**Background and Goal of Study:** Closed-loop systems for propofol have been demonstrated to be safe and reliable for general anesthesia[1]. No study has been conducted using a closed-loop system specifically designed for sedation in patients undergoing a transcatheter aortic valve implantation (TAVI). We developed an automatic anesthesia sedation system that allows closed-loop delivery of propofol for sedation. The device also integrates a decision support system that indicates respiratory and hemodynamic events via audio-visual alarms that provides clinical suggestions and treatment options.

The objective was the feasibility of closed-loop sedation defined as successful robotic sedation without manual override.

**Materials and methods:** After ethics approval, 20 consecutive patients scheduled for TAVI were enrolled. Propofol was administered using closed-loop feedback control. Secondary qualitative observations were clinical performances. The clinical performance of hypnosis control was the efficacy to maintain a bispectral index of 65.

To evaluate the hypnosis performance, the BIS values were stratified into four categories: 'excellent', 'very good', 'good', and 'inadequate' hypnosis control defined as BIS values within 10%, ranging from 11 to 20%, ranging from 21 to 30% or above 30% of the target value, respectively. Respiratory and hemodynamic events were also collected. Respiratory events were defined as $SpO_2$<92% and/or respiratory rate <8/min. Hemodynamic events were defined as mean arterial pressure <60 mmHg and/or heart rate <40 bpm.
**Results and discussion:** Robotic sedation was successful in 19 patients, which is equivalent to 95% (99% CI: 68% to 100%) of the patients undergoing TAVI. One patient was excluded from the final analysis because of a conversion to general anesthesia secondary to a cardiac arrest caused by a pericardial tamponade. The secondary observations revealed that the clinical performance of hypnosis allowed an 'excellent' to 'good' control during 71% (99% CI: 58% to 82%) of the sedation time. Table 1 depicts the respiratory and hemodynamic events.

| Type of event | Respiratory | Hemodynamic |
|---|---|---|
| Number of patients presenting the event; n(%) | 15(79) | 6(31) |
| Number of events per hour | 4 | 2 |

*[Table 1]*

**Conclusion:** The automated closed-loop sedation system tested could be used successfully and safely for patient undergoing TAVI. The results showed satisfactory clinical performance of sedation control.
**Reference:**
1. Zaouter A&A in press

## 07AP10-3

### Transcatheter aortic valve implantation: does general anesthesia reduce the incidence of postprocedural aortic regurgitation compared to sedation?

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**Background and Goal of Study:** Transcatheter aortic valve implantation (TAVI) is a valid option for patients with severe aortic stenosis judged to be at a high surgical risk. There is still no agreement regarding the appropriate type of anaesthesia. If sedation presents several advantages, it has been suggested that general anesthesia lead to less paravalvular leaks (PVL) probably because of the transesophageal echocardiography (TEE) guidance[1]. The objective of this observational trial was to compare the incidence of PVL between patients receiving sedation (TAVI-S) and patients receiving general anesthesia (TAVI-GA). We hypothesized that in an experienced centre TAVI-GA does not reduce the incidence of moderate to severe PVL.
**Materials and methods:** After obtaining ethics committee approval, patient's characteristics, the incidence and grade of PVL were collected in patients undergoing TAVI. Patients in the TAVI-S group received local anesthesia on the site of the transcatheter insertion with a continuous infusion of a sedative agent. The TAVI-GA group received a total intravenous anesthesia to allow the insertion of an endotracheal tube and a TEE probe. After the valve deployment, PVL was deemed by hemodynamic and fluoroscopic measurements in the TAVI-S group. TEE was also used in the TAVI-GA group. A post-dilatation was performed when PVL was > than mild. PVL was assessed with transthoracic echocardiography in both groups on postoperative day 5.
**Results and discussion:** TAVI-S and TAVI-GA was accomplished in 168(67.5%) and in 81(32.5%) patients, respectively. The two groups were similar except for a more frequent history of coronary artery disease (p=0.004), peripheral artery disease (p<0.001) and diabetes (p=0.028) in the TAVI-GA group. Table 1 depicts the incidence and grade of PVL.

| After valve deployment | TAVI- S (n=165) | TAVI-GA (n=78) | P-Value |
|---|---|---|---|
| Absent to mild, n(%) | 159(96) | 76(97) | 0.66 |
| Moderate to severe, n(%) | 6(4) | 2(3) | |
| On postoperative day 5 | TAVI-S (n=163) | TAVI-GA (n=74) | |
| Absent to mild, n(%) | 159(98) | 72(97) | 0.91 |
| Moderate to severe, n(%) | 4(2) | 2(3) | |

*[Incidence and grade of paravalvular leaks]*

A recent trial suggests that increased mortality is associated only with moderate to severe PVL[2]. Our results show no difference between the 2 groups in terms of PVL incidence and grade.
**Conclusion:** Our study indicates that, in an experienced center, moderate to severe PVL is rare and TAVI-GA with TEE guidance doesn't reduce it.
**References:**
1. Klein A&A 2014
2. Jerez-Valer JACC 2014

## 07AP10-4

### Experiences of transcatheter aortic valve implantation with severe aortic stenosis

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Aortic stenosis is the most common and dangerous native valve disease; it affects 2-4% of patients over 65 years of age [1].However, the surgical procedure leads the patients to undergo great risks especially in the elderly population and in patients with concomitant disorders [2].In this retrospectively conducted study, we described and analyzed our experience on TAVI procedures, performed in our hospital.
**Materials and methods:** The approval of the Ethics Committee, June 2012 and December 2013 were reviewed retrospectively. Demographic data, STS, EuroSCORE, aortic valve pressure gradients, the methods of anesthesia and monitoring and postoperative complications were collected.All data were expressed as mean ± standard deviation.
**Results:** Among 57 remaining patients in whom data was collected, mean age was found as 78.6 ± 6.7 years and the 37 were female.The mean pulmonary artery pressure was 46.9 ± 14.2 mmHg,mean pressure gradient (PG) was 48.8 ± 10.7 mmHg, whereas the peak PG was 75.5 ± 17.1 mmHg prior to the TAVI procedure; left ventricular ejection fraction before the TAVI procedure was calculated as 51.2 ± 14.2 %.Analysis of the patient charts revealed a mean value for STS as 7.8 ± 4.7 and a mean value for EuroSCORE as 34.9 ± 14.1 %.In all patients, a probe for transesophageal echocardiography was inserted for real-time monitoring, together with a temporary pacemaker.Implanted valves were expandable CoreValve in 60%, and the Edwards Sapiens XT Valve in 40%.Following completion of the procedure, final femoral angiography was performed in order to verify that there were no vascular injuries.The patients were transferred coronary ICU after extubation.During postoperative period, minor complications were encountered in 11% patients.
**Conclusion:** We determined that TAVI was a procedure with low rate of complications in patients with severe aortic stenosis when the steps of the procedure had been followed meticulously, according to the results of our retrospective study.The anesthesiologist should be a key member of the staff prior, during, and following the intervention.The ongoing prospective trials and retrospective research together with the debate on indications, type of the anesthesia, location where the procedure is held etc, will serve to shed light on the evolvement of this relatively novel technique.
**References:**
1. Ruggeri L et al. *HSR Proc Intensive Care Cardiovasc Anesth*. 2012; 4: 40-6.
2. Covello RD et al. *Minerva Anestesiol*. 2010; 76: 100-8.

## 07AP10-5

### The effect of transcatheter aortic valve implantation on intraoperative left ventricular myocardial performance index

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**Background and Goal of Study:** Transcatheter aortic valve implantation (TAVI) procedure for patients with aortic stenosis is expected to reduce left ventricular after load and following improvement of cardiac function. However, the effect of TAVI on intraoperative left ventricular global function including diastolic function gets less attention.
Myocardial performance index (MPI) is an index that incorporates both systolic and diastolic time intervals in expressing global systolic and diastolic ventricular function.
This retrospective observational study is aimed to investigate the intraoperative left ventricular MPI to assess the effect of TAVI on left ventricular global function.
**Materials and methods:** 11 patients who underwent transfemoral TAVI procedure using SAPIEN XT valve under general anaesthesia were recruited in this study.
Ejection time (ET), isovolumic contraction time (ICT), and isovolumic relaxation time (IRT) were measured from pulse wave tissue Doppler waveforms of mitral annulus obtained using TEE during TAVI procedure. MPI was calculated as (ICT＋IRT)/ET.
The MPI and Stroke volume before balloon aortic valvuloplasty and after prosthetic valve deployment were compared using paired t-test. Statistical significance was defined as the P value less than 0.05.
**Results:** The MPI before balloon aortic valvuloplasty and after prosthetic valve deployment were 0.60±0.16 and 0.62±0.15, respectively. There were no significant differences.
ICT to IRT ratio before balloon aortic valvuloplasty was 1.48 ± 0.66, and significantly decreased to 1.13 ± 0.54 after prosthetic valve deployment.
**Conclusion:** TAVI procedure does not improve intraoperative left ventricular myocardial performance index just after prosthetic valve implantation.

## 07AP10-6

### Elective mechanical cardiopulmonary support during transcatheter aortic valve implantation

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**Background:** Although transcatheter aortic valve implantation (TAVI) is widely known as a low invasive treatment for aortic stenosis (AS), intraoperative hemodynamic changes during TAVI such as rapid pacing are considered to be intolerable to patients with severely impaired cardiac function. Elective mechanical cardiopulmonary support (CPS) during TAVI has been reported to be effective for such extremely high-risk patients [1]. This report aimed to assess the efficacy of elective CPS during TAVI.
**Materials and methods:** Consecutive patients who underwent TAVI for severe AS between October 2009 and August 2015 in our institute were retrospectively enrolled, and were divided into two groups; patients who required elective CPS and those who did not. Preoparative demographic data, echocardiographic findings, surgical data, and postoperative outcome were compared between two groups.
**Results and discussion:** 290 patients were enrolled into the study.17 patients (5.9%) required CPS electively. Preoperatively, the patients with CPS showed significantly smaller aortic valve area
(0.53 ± 0.17 $cm^2$ vs 0.69 ± 0.18 $cm^2$, $p<0.001$), lower ejection fraction (39.7 ± 18.2% vs 63.2 ± 12.0%, $p<0.001$), and lower peak transvalvular pressure gradient (71.2 ± 23.0 mmHg vs 86.1 ±2 9.9 mmHg,
$p<0.04$) and had a higher risk profile (logistic EUROSCORE, 59.1 ± 29.7 % vs 22.1 ± 13.0 %, $p<0.001$). The length of postoperative hospital-stay (days, 15.7 ± 6.8 vs 14.3 ± 15.8, $p=0.71$) and 30 days mortality (5.9% vs 1.1%, $p=0.210$) did not differ between two groups although the frequency of home discharge was lower in the CPS group (70.1% vs 91.2%, $P=0.02$). These results showed that the elective CPS during TAVI enabled the operation to be performed safely with satisfactory postoperative outcomes.
**Conclusion(s):** Elective CPS during TAVI is considered to be effective to perform the safe operation for AS patients at extremely high risk.
**Reference:**
1. Maeda K, Kuratani T, Torikai K, et al. On-pump transcatheter aortic valve replacement in patients with poor left ventricular function. J Card Surg. 2012 Nov;27(6):686-8

## 07AP10-7

### Importance of choose the correct anesthetic technique considering potential complications in transcatheter aortic valve implantation. Report of a case

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**Background:** Transcatheter aortic valve implantation (TAVI) has emerged as an option for treating aortic stenosis (AS) in patients who are poor candidates for surgical aortic valve replacement because of their comorbidities[1,2]. AS is highly prevalent and a life-threatening disease. Although controlled studies show that the type of anesthesia (general anesthesia -GA- vs local anesthesia plus sedation) don't influence survival after TAVI[2], the choose of the anesthetic technique must take into account the possible major complications of TAVI, such as malpositioning, valve migration/embolization, conversion to open surgery, renal failure, need for pacemaker implantation, stroke, and myocardial infarct[1].
**Case report:** We present the case of a 81-year-old woman ASA IV, diagnosed with severe degenerative AS and iliac axis calcified and tortuous; that underwent transapical TAVI. We conducted a thorough induction of a balanced GA given the lability of the hemodynamic (HD) status of the patient, we monitored with invasive blood pressure, ECG, oximetry, canography, temperature, transesophageal echocardiogram (TEE) and intravenous pacemakers. While performing the procedure due to poor positioning of the prosthesis, it migrates into the left ventricle. This is evidenced clinically with a fall in cardiac output and on the TEE with severe regurgitation. Due to the gravity of the situation and HD deterioration of the patient since the prosthesis was still attached to the guide by which was inserted, a new prosthesis was introduced through the open migrated prosthesis by the same guide. Then it was placed a transapical laparoscopic trocar through which it was introduced a pliers to extract the embolized prosthetic.
**Discussion:** The aim of this report is that given the anesthetic-surgical treatment required by the patient and the hemodynamic lability of the situation, the patient possibly wouldn't have survived of not being because he was under GA.
**References:**
1. Neragi-Miandoab S. and Michler, R. A Review of Most Relevant Complications of Transcatheter Aortic Valve Implantation. ISRN Cardiology, 2013:1-12.
2. Gauthier C, et al. Mid-term survival after transcatheter aortic valve implantation: Results with respect to the anesthetic management and to the access route (transfemoral versus transapical). Ann Card Anaesth. 2015;18(3):343-51.
**Learning points:** It is crucial to consider the management of possible complications of surgical procedures when choosing the anesthetic technique.

## 07AP10-8

### Transcatheter aortic valve implantation procedure does not improve intraoperative left ventricular compliance

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**Background and Goal of Study:** Transcatheter aortic valve implantation (TAVI) procedure for patients with aortic stenosis is expected to reduce left ventricular after load and following improvement of cardiac function. However, the effect of TAVI on perioperative diastolic function gets less attention. This retrospective observational study is aimed to investigate the intraoperative left ventricular compliance to assess the effect of TAVI on diastolic function.

**Materials and methods:** Fourteen patients who underwent transfemoral TAVI procedure using SAPIEN XT valve under general anaesthesia were recruited in this study.
Left ventricular pressure just before balloon aortic valvuloplasty and after prosthetic valve deployment were measured using intracardiac catheter by surgeon.
Intraoperative left ventricular inflow volume before and after those procedures were calculated using transmitral flow velocity time integral and mitral valve orifice area obtained using intraoperative TEE.
Left ventricular compliance was calculated by dividing the left ventricular inflow volume by the left ventricular early to end diastolic pressure change.
Statistical analysis was performed using paired t-test. P value less than 0.05 was defined as significant difference.
**Results:** The left ventricular inflow volume was 84.9 ± 26.6 ml (mean±SD) before balloon aortic valvuloplasty, and significantly increased to 98.6 ± 27.0 mmHg after prosthetic valve deployment.
The left ventricular compliance just before balloon aortic valvuloplasty and just after prosthetic valve deployment were 5.1±2.4 ml/mmHg and 4.4±1.1 ml/mmHg, respectively. There was no significant difference between these left ventricular compliances.
**Conclusion:** TAVI procedure does not improve left ventricular compliance just after prosthetic valve deployment. This result indicates that the continuation of careful circulatory management is still required even after a valve deployment is successfully performed.

## 07AP10-9

### Neuraxial hematoma in TEVAR procedure after lumbar catheter removal

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**Background:** The incidence of SCI (Spinal Cord Injury) associated with surgical treatment of thoracoabdominal aorta diseases has decreased considerably with TEVAR (thoracic endovascular aortic repairs) but nonetheless it continues to be significant. Cerebrospinal fluid drainage (CSFD) is a class IB recommendation to prevent SCI in open repairs but it has some potential complications. The indication of CSFD in TEVAR is controversial.
**Case report:** A 78 years old patient scheduled for TEVAR due to a descending thoracic aortic aneurysm. As a personal history the patient had an ischaemic cardiopathy treated with AAS.
A lumbar spinal catheter to drain CSF was inserted preoperatively. A long stent with partially left subclavian occlusion was implanted. Anesthesia and postoperative evolution in ICU was uneventful.
After 48 hours at the hospital ward and 12 hours without draining cerebrospinal fluid, the catheter was removed. Five hours later, the patient started with severe lumbar pain radiating to the right leg associated with paresis and patellar arreflexia in lower right limb without sensory disturbances.
Urgent magnetic resonance was performed and reported an acute epidural hematoma that compromised the anterior spinal canal from D12 to L3. Emergent decompressive laminectomy was performed with full recovery. Patient was discharged home at the 7th day without neurological complications.
**Discussion:** The goal of using CSFD is to decrease CSF pressure in order to improve spinal cord perfusion pressure to prevent SCI. However, there are not prospective randomized trials focused on the use of CSFD in TEVAR, therefore there is not consensus about it.We only consider the use of prophylactic lumbar CSFD in TEVAR if there are SCI risk factors (previous abdominal aortic aneurysm repair, severe atherosclerosis, hypotension during the procedure, injury to the external iliac artery, occlusion of the left sublavian artery or hypogastric arteries and extensive coverage of the thoracic aorta by graft >205mm).
**Reference:**
Fedorow CA, et al. Lumbar cerebrospinal fluid drainage for thoracoabdominal aortic surgery: rationale and practical considerations for management. Anesth Analg 2010; 111:46-58.
**Learning points:** The use of CSFD in TEVAR is individualized and based on the consensus agreement among the patient, anesthesiologist and surgeon. Nonetheless, physicians must be alert if pain or lower limb neurologic deficits occur. In these cases emergent MR is mandatory.

## 07AP10-10

### Thoracic endovascular aortic repair: eight years of experience in a tertiary hospital

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**Background and Goal of Study:** Although thoracic endovascular aortic repair (TEVAR) was initially used to treat patients considered unfit for surgery, it is now the preferred technique given its improved risk profile compared to open thoracic aortic surgery. Acute kidney injury (AKI) is a known complication, increasing surgical morbidity and mortality. The aim of this study was to revise the patients' characteristics, anaesthetic approach and outcomes of TEVAR at our hospital.
**Materials and methods:** We performed a retrospective analysis of patients undergoing TEVAR from 2006 to 2013 excluding patients without perioperative serum creatinine values. Patients' demographics and perioperative data were collected. AKI was defined as a rise of 0.3 mg/dl in postoperative serum creatinine. Descriptive analysis was performed and the Student's-T, Mann-Whitney, Fischer's exact or Chi-square tests were used. Univariate logistic regression were done with calculation of an Odds Ratio (OR) and its 95% Confidence Interval.
**Results and discussion:** We included 28 patients, 26 were male. The procedure was urgent in 61% of cases. ASA physical status was II (21%), III (36%), IV (39%) and V (4%). Frequent comorbidities were: 79% arterial hypertension, 64% chronic pulmonary disease, 46% dyslipidaemia, 36% tobacco consumption, 29% chronic kidney disease, 25% auricular fibrillation, 20% coronary disease, 18% diabetes mellitus, 14% cerebrovascular disease, 14% congestive heart failure. Patients were submitted to general (54%), regional (42%) or local anaesthesia with sedation (4%). Red blood cells (RBC) were transfused intraoperatively in 25% of cases. Preoperative aneurysm diameter was 65 [54-86] mm and surgery duration was 4 [2-6] hours. After surgery, 6 patients had AKI, 2 presented with stroke and 2 died during hospital stay. In univariate analysis, surgery duration (OR 1.7, p= 0.032) and intraoperative RBC transfusion (OR 3.4, p=0.05) were identified as predictors of AKI. Post-operative AKI was associated with longer hospital stay (p=0.009).
**Conclusions:** Patients undergoing TEVAR have important comorbidities. Longer surgery and intraoperative RBC transfusion increased the risk of AKI. Surgery duration could be significant because of 2 factors: surgical complexity and amount of contrast used during surgery. A limitation of our study is not having this data available for analysis.

## 07AP10-12

### Peri-operative assessment of severe aortic stenosis prior to non-cardiac surgical procedures

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Aortic stenosis is the most common valvular disease affecting people over the age of 65. Severe aortic stenosis is associated with a mortality of 43.1%[1] and perioperative mortality of 13%[2]. TAVR/TAVI and PABD are options available for patients with severe aortic stenosis who need immediate correction prior to non-cardiac surgeries. PABD is associated with a mortality of 2-3% and post procedure stroke rate of 1-2%[2]. TAVR and PABD are bridging strategies for patients that are not candidates for traditional valve replacement. Intraoperatively, patients with severe aortic disease have an unfavorable hemodynamic state due to anesthetic agents and surgical stress. They are managed with strict blood pressure and heart rate parameters.
We present an 86 year old woman with history of severe aortic stenosis (AV area 0.3) who was scheduled for surgical correction of a left intratrochanteric fracture. Preoperative echocardiogram showed aortic valve peak pressure of 85 mmHg and moderate pulmonary hypertension. A PABD was performed to decrease the overall peak gradient to 30 mmHg prior to surgery. Cardiology consultation recommended preoperative beta-blockade along with a short OR time. Anesthetic plan included pre-induction with midazolam and arterial line and induction with 1 mg of fentanyl. Maintenance of anesthesia included only a remifentanil infusion and intermittent midazolam boluses. She tolerated the procedure well, without any significant hemodynamic changes. She was

monitored in the cardiothoracic ICU overnight and extubated on postoperative day 1 without any complications.
Severe aortic stenosis poses several challenges intra-operatively increasing the morbidity and mortality in patients who are at high risk. Both the European and American Heart Association guidelines highlight the importance of appropriate preoperative management of severe aortic stenosis, with either TAVR or PABD, prior to non-cardiac procedures. Our intra-operative approach included TIVA. Although volatile agents could be used, the risk of hypotension with sevoflurane was significant, outweighing any benefits when compared to our TIVA approach. There is not enough information in the literature comparing risks and benefits of TIVA vs inhaled anesthesia in cardiac patients undergoing non-cardiac procedures[3]. Given that our patient did not have any post-operative complications from either her surgery or PABD, we would recommend using the TIVA approach intra-operatively.

## 07AP10-13

### Ultrasonography guided radial artery cannulation increases the first attempt success rate

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**Background and Goal of Study:** Anaesthesiologists perform arterial cannulation for continuous monitoring of blood pressure and sampling of blood. Generally, the palpation technique is used for catheterization, but ultrasound guidance has shown promising results. “Dynamic needle tip positioning” (DNTP) is a new and easy method of ultrasound guided vascular access. We aimed to compare the traditional palpation technique with the DNTP performed by four anaesthesiology residents.
**Materials and methods:** The study was a randomized, single-blinded, controlled crossover study. Patients scheduled for elective coronary surgery were enrolled and underwent bilateral radial artery catheterization using both techniques. Every operator applied both techniques. All procedures were video recorded for offline evaluation of endpoints. The primary endpoint was the first attempt success rate. The secondary endpoints were:
(1) number of skin perforations,
(2) number of needle retractions,
(3) needle manipulation time,
(4) total time
(5) number of catheters used,
(6) frequency of aborted attempts or cross-overs and
(7) pain scores (VAS).
**Results and discussion:** Forty patients participated in the study. The first attempt success rate was significantly higher in the DNTP group compared with the traditional palpation group (36/40 vs. 28/40, P=0.022).
The traditional palpation technique group needed a higher number of skin perforations (44 vs. 58, P=0.016), needle retractions (P=0.001) and catheters (42 vs. 52, P=0.011) compared with the DNTP group. Neither the total time required for arterial cannulation, the needle manipulation time nor the VAS scores were significantly different between the groups (all P>0.407). Crossover from one technique to the other was only required in the palpation group whereas 7/40 (17.5%) crossed over to the DNTP group (P=0.016).
**Conclusion(s):** DNTP technique significantly improved clinically applicable elements of radial artery catheterization performed by anaesthesiology residents with limited ultrasonography qualifications.

## 07AP11-1

### Reference change values of plasma and urinary neutrophil gelatinase-associated lipocalin (NGAL) in coronary artery bypass surgery

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**Background and Goal of Study:** Interpretation of changes in NGAL must take into account the reference change value (RCV), which integrates biological and analytical variation in a specific clinical setting. RCV is not reported yet for NGAL. We aimed to calculate the RCV of plasma and urine NGAL (pNGAL & uNGAL) in the context of coronary artery bypass graft surgery (CABG).
**Materials and methods:** After approval of our Institutional Review Board and informed consent, this prospective single-center observational study included patients with a preoperative glomerular filtration rate of 30 to 90 $ml.min^{-1}.1.73m^{-2}$, scheduled for elective CABG with cardiopulmonary bypass. Patients free from postoperative renal aggression according to KDIGO criteria (1) or a plasma creatinine $\Delta < 0$
($\Delta$ = value at day 1 - value at induction) (2), were included in the study. pNGAL and uNGAL concentrations were measured at anesthesia induction and on the 2nd and 7th postoperative day (time points were considered comparable without renal dysfunction), and normalized to plasma proteins or urine creatinine respectively. The RCV was given by the formula = $1.96 \times \sqrt{2} \times \sqrt{(CVa^2 + CVi^2)}$ (1), were CVi is the intra-individual variability, and CVa the reported analytical coefficient of variation of 5%(3).
**Results and discussion:** We included 102 patients. Renal aggression was absent in 73 patients according to the KDIGO criteria and in 26 patients according to plasma creatinine Δ. Results are shown in Table 1.

| | | CVi (%) | RCV (%) |
|---|---|---|---|
| **No acute kidney injury according to KDIGO criteria, n=73 (72%).** | pNGAL | 27 | 75 |
| | pNGAL/prot | 31 | 87 |
| | uNGAL | 89 | 248 |
| | uNGAL/uCreatinine | 165 | 459 |
| **No acute kidney injury according to Δ of plasma creatinine, n=26 (25%).** | pNGAL | 38 | 107 |
| | pNGAL/prot | 43 | 119 |
| | uNGAL | 359 | 996 |
| | uNGAL/uCreatinine | 233 | 645 |

*[Table 1]*

**Conclusion:** A two-fold change in pNGAL and a three to ten-fold change in uNGAL occur in the absence of renal dysfunction. No major improvement is observed following normalization. In the context of CABG, “noise” changes in NGAL are important in patients with moderate preoperative alteration of glomerular filtration. These high RCV are essential for correct interpretation.
**References:**
1. Kidney Int Suppl. 2012; 2: 1-138.
2. Guinot PG et al. Eur J Anaesthesiol. 2015 Aug;32(8):535-42.
3. Grenier FC et al. Clin Biochem. 2010 Apr;43(6):615-20.

## 07AP11-2

### Influence of cardiopulmonary bypass (CPB) on urinary neutrophil gelatinase-associated lipocalin (uNGAL) ability to predict cardiac surgery-associated acute kidney injury (CSA-AKI)

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**Background and Goal of Study:** uNGAL has been proposed as a useful biomarker to predict CSA-AKI. Recent studies have demonstrated that the relationship between NGAL and renal outcomes may not be as strong as previously assumed. In this regard, recent insights into the molecular nature of NGAL may offer a partial explanation. NGAL might be released not only by tubular cells but also by neutrophils activated by systemic inflammatory triggers such as CPB. Therefore, there would be detectable differences in NGAL release dependent on the involvement and duration of CPB. Accordingly, we conducted a prospective observational study to assess the influence of CPB on uNGAL release.
**Materials and methods:** We recruited an opportunity sample during a 9-month period, enrolling all patients undergoing cardiac surgery with standard CPB (sCPB), with minimal extracorporeal circulation (MECC) or with off-pump surgery who met the inclusion criteria. Diagnosis of CSA-AKI was made using the KDIGO criteria. uNGAL was measured using an ARCHITECT platform at 4 points: baseline and postoperatively (admission ICU, day1 and day2 after surgery).
The relationship between variables was assessed using Spearman's rank correlation coefficient.
**Results and discussion:** We obtained a cohort of 288 adult cardiac surgery patients.uNGAL levels throughout the observation period were higher in those patients with sCPB when compared with MECC or off-pump surgery. Immediately after surgery, sCPB induced greater uNGAL release compared to MECC or off-pump surgery. Moreover, such early uNGAL release correlated with CPB duration ($r = 0.505$; $p < 0.001$) but not with peak serum creatinine values on day 3 or 7 after surgery.
Patients who had off-pump surgery and developed CSA-AKI had lower median values of uNGAL compared to those receiving surgery under sCPB and developing CSA-AKI. Patients who did not develop CSA-AKI but received sCPB had higher median values of uNGAL compared to those who had off-pump surgery.
Use of CPB results in the systemic release of pro-inflammatory cytokines, with subsequent induction of neutrophil expression. NGAL can be then filtered by the kidney and excreted in the urine. According to this, NGAL measured in the urine could be composed of a combination of NGAL secreted by renal tubular cells as well as filtered NGAL from systemic release.
**Conclusion(s):** uNGAL ability to predict CSA-AKI and other renal outcomes might be influenced by its complex molecular nature.

## 07AP11-3

### Does hetastarch-inhibited platelet aggregation affect platelet count after cardiac surgery with cardiopulmonary bypass?

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**Background and Goal of Study:** Administration of hetastarch dose-dependently impairs platelet function. This effect could potentially lead to less platelet activation as well as aggregation, which may consequently cause decreased platelet destruction and consumption within the extracorporeal circulation during cardiac surgery. We, therefore, investigated if 6% 130/0.4 hydroxyethyl starch (HES) administered in the course of cardiac surgery mitigates the decline in platelet count, which has been described postoperatively.
**Materials and methods:** Patients were randomly either assigned to the HES (n=81) or the RL (Ringer's lactate) control group (n=79). The latter received RL for pump priming and fluid loading only while up to 50 mL/kg body weight HES could be administered to patients of the HES group. Pump priming in the HES group always included 1 L of HES. Platelets were determined before and again immediately after surgery. The decrease in platelet count in each group was compared with a t-test. Statistical significance was defined as a P-value $<0.05$. Values are given as means ± SD.
**Results and discussion:** There were no differences in patient characteristics, type and duration of surgery, management of anticoagulation on bypass, the amount of administered vasopressors and inotropes, and in the total volume of platelet concentrate transfusion (n=2 per group) between groups. Control patients received on average 1 L more RL as HES patients indicating a more pronounced volume effect of HES compared to RL. Preoperative platelet count was 234 ± 64 x $10^9$/L (HES) and 222 ± 54 x $10^9$/L (RL, $P > 0.05$). Contrary of what we expected, the drop in the platelet count was more distinct in the HES group (-128 ± 50 x $10^9$/L) as compared to the RL group (-94 ± 45 x $10^9$/L, $P < 0.05$).
**Conclusion:** Presence of accentuated hemodilution of HES when given at a dosage of up to 50 mL/kg body weight obviously outweighs a potential benefit of diminished platelet activation and subsequent consumption within the cardiopulmonary bypass circuit. HES in this setting may thus be potentially harmful as it accounts for platelet dysfunction and thrombocytopenia.

## 07AP11-4

### Urinary neutrophil gelatinase-associated lipocalin (uNGAL) as predictor of KDIGO-diagnosed cardiac surgery-associated acute kidney injury (CSA-AKI) and the composite outcome $MAKE_{365}$

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**Background and Goal of Study:** uNGAL has been considered as a promising biomarker of CSA-AKI. However, its ability to predict CSA-AKI in the literature is inconsistent (AUC-ROC values ranging from 0.96 to 0.61).These discrepancies may be due to the wide range of CSA-AKI definitions. Current KDIGO classification combines the benefits of previous criteria, extending the diagnostic period to 7 days.
Moreover, it remains unclear how robust the relationship between uNGAL and renal outcomes actually is in clinical practice. Recently, a composite renal outcome measure of major adverse kidney events to 30 days ($MAKE_{30}$) has been used in critically ill patients to capture an aggregate of renal outcomes of clinical importance.
Accordingly, we conducted a prospective observational study to investigate the relationship between uNGAL concentrations, KDIGO diagnosed CSA-AKI and MAKE at 365 days in cardiac surgical patients.
**Materials and methods:** We conducted a prospective observational study including all patients undergoing cardiac surgery during a nine-month period. Diagnosis of CSA-AKI was made using the KDIGO criteria. uNGAL was measured using the ARCHITECT platform at 4 time-points: baseline and postsurgery (admission ICU, day1 and day2).
We defined $MAKE_{365}$ as a composite outcome of death, use of renal replacement therapy, or persistence of renal dysfunction 1 year after surgery.
The ability of uNGAL to predict CSA-AKI and $MAKE_{365}$ was assessed using the AUC-ROC.
**Results and discussion:** A cohort of 288 adult cardiac surgery patients. CSA-AKI occurred in 36.1% of patients. 53.8% developed stage 1; 24% developed CSA-AKI stage 2 and 22.2% developed stage 3. 22 of the 288 (7.6%) required RRT during ICU admission. No measure of uNGAL accurately predicted CSA-AKI (including severe stages) and $MAKE_{365}$
Our findings suggest that the underlying relationship between CSA-AKI and uNGAL release is likely more complicated than is currently understood. Recent insights into the molecular nature of NGAL may offer a partial explanation. The limited ability of the NGAL assays to distinguish between the various molecular forms of uNGAL could be an explanation. NGAL might be a more specific AKI marker in settings where systemic inflammation is less pronounced.
**Conclusion(s):** uNGAL had a limited predictive ability for CSA-AKI and $MAKE_{365}$. Adding uNGAL to the clinical early detection of CSA-AKI should wait until assays measuring kidney-specific NGAL are available.

## 07AP11-5

### Plasma and urine NGAL: thresholds associated with maximum sensitivity to predict acute kidney injury after coronary artery bypass surgery with cardiopulmonary bypass

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**Background and Goal of Study:** The Neutrophil gelatinase-associated lipocalin (NGAL) is a biomarker proposed for early detection of acute kidney injury (AKI), but its diagnostic performance depends on the clinical situation and on preoperative renal function [1]. Our goal was to define NGAL thresholds associated with high sensitivity to predict AKI after coronary artery bypass graft surgery (CABG).
**Materials and methods:** After IRB approval and informed consent, we included patients with a glomerular filtration rate of 30 to 90 $ml.min^{-1}.1.73m^{-2}$, scheduled for a CABG under cardiopulmonary bypass. Plasma (pNGAL) and urine (uNGAL) NGAL were determined : at anesthesia induction, after aortic clamping (H2), at first (H1) and fourth (H4) hour in the ICU and 1st, 2nd and 7th postoperative days.
AKI was defined according to KDIGO criteria [2] or by a plasma creatinine $\Delta > 0$ ($\Delta$ = value day 1 - value at induction) [3]. Values are expressed as medians [IQR]. After calculating the area of ROC curves (AUC), pNGAL and uNGAL thresholds were proposed for a sensitivity>85%.
**Results and discussion:** We included 102 patients in the study: 13 women (13%); with a age of 65 years old (extreme 40-85) and an EuroSCORE of 2.06 [1.34-3.73]. Surgery consisted in 4 (extremes: 1-6) coronary anastomoses, with an aortic clamping time of 38 minutes [31-42] and a time of CPB of 44 minutes [38-50]. In-hospital mortality occurred in 3 patients (3%). Hospital length of stay was 9 days [7-14]. AKI was present in 29 patients (28%) according to the KDIGO criteria and in 76 patients (75%) according to plasma creatinine Δ. Results are presented in table1.

| | | NGALp H1 (ng/ml) | pNGAL/prot H1 (ng/mg) | uNGAL H1 (mg/l) | uNGAL/CreatU H1 (ng/µmol) |
|---|---|---|---|---|---|
| **AKI defined by KDIGO criteria** | AUC ROC | 0.501 | 0.531 | 0.675 | 0.670 |
| | NGAL threshold | 122 | 5.2 | 5 | 0.78 |
| | Sensitivity | 0.88 [0.75 ; 1] | 0.88 [0.71; 1] | 1 [0,86; 1] | 0.88 [0.72 ; 1] |
| | Specificity | 0.23 [0.13 ; 0.33] | 0.34 [0.22 ; 0.46] | 0 [0 ; 5,2] | 0.31 [0.21 ; 0.42] |
| **AKI defined by plasma creatinine Δ > 0** | AUC ROC | 0.475 | 0.546 | 0.597 | 0.708 |
| | NGAL threshold | 101 | 2.21 | 5 | 0.67 |
| | Sensitivity | 0.87 [0.77 ; 0.94] | 0.87 [0.78 ; 0.94] | 1 [0.95 ; 1] | 0,.86 [0.77 ; 0.93] |
| | Specificity | 0.17 [0.04 ; 0.37] | 0.17 [0.04 ; 0.35] | 0 [0 ; 0.14] | 0.35 [0.17 ; 0.57] |

*[Table 1]*

**Conclusion:** We propose thresholds of pNGAL and uNGAL associated with high sensitivity to predict AKI after CABG in patients with moderate preoperative alteration of glomerular filtration. These thresholds offer low specificity. Normalization did not increase diagnostic performance.
**References:**
1. Ann Clin Biochem. 2014 May;51(Pt 3):335-51
2. Kidney Int. Suppl. 2012; 2: 1-138
3. Crit Care Med. 2008 Apr;36(4):1129-37

## 07AP11-6

### Activation of complement factor B contributes to postoperative myocardial necrosis after cardiac surgery

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**Objective:** Cardiopulmonary bypass (CPB) and aortic cross clamping (AXCL) during cardiac surgery lead to global heart ischemia, contributing to postoperative myocardial necrosis. Basic science studies have shown that ischemia/reperfusion of heart tissue elicits an acute inflammatory response, involving several complement factors. Anti-complement C5 has been tested in clinical trials with positive results. However, activation of earlier complement factors would be unaffected. Animal model studies suggested that complement factor B (fB), an initial factor in the alternative pathway, may be involved in postoperative myocardial necrosis. Whether fB plays a similar role in humans has not been determined. To investigate the role of fB in postoperative myocardial necrosis, we evaluated fB activation in cardiac surgery patients.
**Methods:** A total of 105 adult patients undergoing elective cardiac surgery with CPB were recruited after IRB approval. Blood was sampled from the coronary and peripheral circulations of cardiac patients at 7 defined perioperative periods identifying major stages in the surgery. fB activation was evaluated by ELISA assay and Western blotting, and was correlated with the myocardial necrosis marker, cardiac troponin I (cTnI). Statistically significant correlations between the levels of Bb, the active fragment of fB, and the levels of cTnI at designated time points were determined using Spearman's correlation. Multivariate regression analysis was used to test whether perioperative Bb levels can independently predict postoperative cTnI increases. $P<0.05$ was considered to be statistically significant.
**Results:** Levels of Bb increased significantly in the coronary circulation following ischemia compared with prior to application of AXCL (before AXCL = 2.4 ± 2.0 $\mu$g/ml; after AXCL cessation = 4.4 ± 2.9 $\mu$g/ml, $P<0.01$), and increased in peripheral blood at major steps in cardiac surgery ($P<0.05$ at all time points). Univariate analysis showed that perioperative Bb levels in the coronary and peripheral circulations correlated significantly with the postoperative cTnI levels ($P<0.01$ at all time points).
Multivariate analysis revealed that these correlations were dependent on the time lengths of CPB and AXCL.
**Conclusions:** Our study is the first report to demonstrate that AXCL caused significant changes in Bb in the coronary and peripheral circulation. This study indicates that fB activation contributes directly to postoperative myocardial necrosis.

## 07AP11-7

### Incremental value of preoperative copeptin for predicting myocardial injury after non-cardiac surgery (MINS)

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**Background and Goal of Study:** Copeptin, a novel marker of endogenous stress, has shown diagnostic and prognostic value in non-surgical patients with a suspected coronary event. We aimed to assess the incremental value of copeptin in addition to established preoperative risk indices to predict the occurrence of myocardial injury after noncardiac surgery (MINS), a condition associated with increased mortality.[1]
**Materials and methods:** This secondary analysis of prospectively collected data included adults with risk factors for or a history of coronary artery disease undergoing elevated risk surgery.[2] We examined preoperative copeptin in patients without elevated preoperative troponin values and its association with MINS by receiver operator characteristics (ROC) curves, logistic regression, and net reassignment improvement.
**Results and discussion:** Of the 190 patients included, 33 (17.4%) experienced MINS within 48 hours and 17 (8.9%) experienced cardiac death and/or major adverse cardiac events (MACE) within the first postoperative year. Preoperative copeptin showed an area under the ROC curve of 0.66 (95% CI 0.55 - 0.76) for MINS and an optimal cut-off of 9.6 pmol $litre^{-1}$. This cut-off was an independent predictor of MINS with an odds ratio of 4.17 (95% CI 1.80 - 10.16) when adjusted for age, sex, NT-proBNP, and the revised cardiac risk index. The net reassignment improvement for MINS was between 39%

and 50% for both events and nonevents when adding copeptin to established preoperative risk indices. No significant difference in cardiac mortality and/or MACE was observed, possibly because of insufficient power.
**Conclusion(s):** Copeptin exceeding 9.6 pmol litre $^{-1}$ was associated with significantly higher rates of MINS and improved risk-stratification in patients scheduled for non-cardiac surgery with negative preoperative troponin.
**References:**
Botto, F, et al., Myocardial injury after noncardiac surgery: a large, international, prospective cohort study establishing diagnostic criteria, characteristics, predictors, and 30-day outcomes. Anesthesiology, 2014. 120(3): p. 564-78.
Lurati Buse, G.A., et al., Randomized comparison of sevoflurane versus propofol to reduce perioperative myocardial ischemia in patients undergoing noncardiac surgery. Circulation, 2012. 126(23): p. 2696-704.
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## 07AP11-8

### Tranexamic acid has no influence on cardioprotection induced by ischaemic preconditioning or remote ischaemic preconditioning

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**Background and Goal of Study:** Ischaemic Preconditioning (IPC) and Remote Ischaemic Preconditioning (RIPC) reduce ischaemia/reperfusion injury in experimental animal studies [1]. In contrast, clinical data are contradictive. This might be caused by interactions of drugs used in daily clinical routine. The antifibrinolytic Aprotinin, a precursor of the currently used tranexamic acid (TXA), was shown to abolish cardioprotection by preconditioning [2]. The aim of this study was to investigate, whether TXA has an impact on cardioprotection induced by IPC and/or RIPC.
**Material and methods:** Animals were treated in compliance with institutional and national guidelines. Anaesthetized Wistar rats were thoracotomized and, after pericardiotomy, a snare occluder was passed around a major left coronary artery. After surgical preparation, animals recovered for 20 minutes before starting the preconditioning protocol. Subsequently, rats were exposed to 25 minutes regional myocardial ischemia followed by 120 minutes reperfusion. At the end of reperfusion, hearts were excised for infarct size measurement by TTC staining.
Animals were randomized into six groups. Control animals (Con, n=10) were not further treated. IPC was induced by 3 cycles of 5 minutes of ischaemia and reperfusion (IPC, n=8); RIPC was induced by 4 cycles of 5 minutes of ischaemia and reperfusion of the hind legs (RIPC, n=9). In additional groups tranexamic acid (bolus 10 mg/kg BW, continuously 2 mg/kg BW) was administered i.v. with (TXA+IPC, TXA+RIPC; each group n=8) and without preconditioning (TXA, n=8).
Statistical analysis: One-way ANOVA with Tukey post hoc test. Data are expressed as mean±SD.
**Results and discussion:** In the control group infarct size was 56±11% of area at risk. IPC and RIPC reduced infarct size to 30±6% and 40±8%, respectively (each P<0.05 vs. Con). Tranexamic acid alone had no influence on infarct size (TXA: 54±15%; ns vs. Con). Furthermore, tranexamic acid did not affect cardioprotection by IPC or RIPC (TXA+IPC: 25±8%, TXA+RIPC: 41±10%; each P<0.05 vs. Con).
**Conclusion:** Administration of tranexamic acid had no effect on myocardial infarction or the cardioprotective effects of ischaemic preconditioning or remote ischaemic preconditioning.
**Literature:**
1. Pharmacol Rev. 2014 Oct;66(4):1142-74,
2. Anesthesiology 2010 Dec;113(6):1289-98.

## 07AP11-9

### Comparison of the cardioprotective properties of Propofol and Sevoflurane in patients undergoing coronary surgery with cardiopulmonary bypass

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**Background and Goal of Study:** The intravenous propofol and the inhaled sevoflurane are known anesthetic agents that are commonly used to induce patients in anesthesia in cardiosurgery including bypass graft. A number of studies have been conducted in order to compare these two drugs for their cardioprotective properties, with controversial results. The aim of this study was to compare the anesthetic agents, sevoflurane and propofol, in cardiosurgery with bypass graft for their cardioprotective properties and for their ability to maintain the patient`s hemodynamic stability during the surgery.
**Materials and methods:** This is a double-blind, prospective, randomized and controlled clinical trial conducted in a large general hospital of Athens, Greece. The sample of the study consisted of 61 patients who underwent CABG and were anaesthetized with either propofol or sevoflurane. For the statistical analysis of the study we used the statistical package SPSS for Windows (version 21) and the statistical significance was set to p = 0.05.
**Results and discussion:** The propofol group had significantly higher diastolic blood pressure one hour (64.4±11.4 vs 56.9±12.5 mmHg, p<0.05) and 4 hours after the start of the surgery (55.6 ±9.7 vs 48.4±7.7 mmHg, p<0.05) and received significantly higher dose of postoperative anesthesia (4.3±4.3 vs 2.5±1.9 ml/hr, p<0.05) than the sevoflurane group. Also, the patients who received propofol had significantly higher troponin concentration 8 hours after the end of surgery than the sevoflurane group (1202.7±551.7 vs 175.5±139.3ng/ml, p<0.05). Patients who received sevoflurane compared with propofol group had significantly higher levels of oxygen saturation two hours after the start of surgery (99.6±0.7 vs 98.9±1.3%, p<0.05), higher dose of dobutamine four hours after the start of surgery (21.1±6.3 vs 16.3±7.7 mg, p<0,05) and higher VAS-pain scale scoring after extubation (4.6±2.8 vs 3.1±2.4, p<0.05).
There are studies indicating the cardioprotective effects of sevoflurane (Soro et al., 2012), other support the administration of propofol (Yildirim et al., 2009) and others found no difference between the two drugs (De Hert et al., 2009).
**Conclusion:** A sevoflurane based anaesthesia in patients undergoing coronary bypass graft surgery may benefit patients maintaining aimodynamic stability during surgery and by decreasing the troponin release 8 hrs after surgery, supporting the cardioprotective effects of sevoflurane over propofol.

## 07AP11-11

### Partial aortic cross-clamping, inflammation and oxidative stress response: does anaesthetic matters?

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**Background and Goal of Study:** Inflammation and oxidative stress are considered as key mediators of complications after cardiac surgery. Sevoflurane, compared with propofol-based anesthesia, attenuated the release of serum markers of cellular injury in a model of thoracic-aortic occlusion in pigs(1) and provided greater protection against myocardial oxidative stress in off-pump coronary surgery(2).
This study has been performed on the hypothesis that sevoflurane-based anesthesia reduces inflammation and oxidative stress compared with propofol-based anesthesia during partial aortic clamping.
**Materials and methods:** Ten healthy minipigs were divided into 2 groups (5 per group) according to the anaesthetic received (sevoflurane 2% or propofol 11-12mg/kg/h). After median sternotomy, a side clamp (20min) was applied in the ascending aorta. To investigate the inflammatory and oxidative stress response to partial aortic clamping we studied the biomarkers: Heat shock protein 70 (Hsp70), C3a, tumor necrosis factor (TNF) and nitric oxide at baseline (before aortic cross-clamp) and after aortic cross-clamp removal (reperfusion). Arterial blood samples were analyzed. All data were expressed as mean±SEM.

**Results:** Animals in both intervention groups did not differ in terms of sex (male/female 5/0) and body weight (sevoflurane 34±1 kg; propofoll 25±3 kg). At baseline, comparable values were obtained in both groups.
The results showed that, after aortic cross-clamp removal, there was no significant difference between the two groups, sevoflurane and propofol (Table 1).
**Conclusions**: After ascending aorta partial clamping, sevoflurane-based anesthesia did not reduce inflammation and oxidative stress compared with propofol-based anesthesia.
**References:**
1. Annecke T, Kubitz JC, Kahr S, et al. Effects of sevoflurane and propofol on ischaemia-reperfusion injury after thoracic-aortic occlusion in pigs. Br J Anaesth. 2007;98:581-90.
2. Ballester M, Llorens J, Garcia-de-la-Asuncion J, et al. Myocardial oxidative stress protection by sevoflurane vs propofol: a randomised controlled study in patients undergoing off-pump coronary artery bypass graft surgery. Eur J Anaesthesiol 2011;28:874-81.

| | PROPOFOL (n=5) | SEVOFLURANE (n=5) | p |
|---|---|---|---|
| Hsp70 | | | |
| Baseline | 5.12 ± 1.11 | 4.08 ± 0.27 | 0.386 |
| After PAC | 5.68 ± 1.49 | 4.55 ± 0.48 | 0.489 |
| C3a | | | |
| Baseline | 22.35 ± 4.75 | 13.11 ± 4.10 | 0.191 |
| After PAC | 18.92 ± 3.29 | 13.26 ± 3.77 | 0.301 |
| TNF | | | |
| Baseline | 42.70 ± 8.24 | 33.56 ± 16.70 | 0.615 |
| After PAC | 29.16 ± 0.92 | 34.68 ± 10.68 | 0.566 |
| Nitric Oxide | | | |
| Baseline | 610.06 ± 33.96 | 732.61 ± 129.93 | 0.514 |
| After PAC | 418.12 ± 66.44 | 691.27 ± 11.81 | 0.143 |

*[Table 1. Inflammatory and oxidative stress response before and after removal of partial aortic clamping (PAC). Values are expressed as mean±SEM]*

## 07AP11-12

### The investigation of relationships between interleukin 18 -607 C/A and -137 G/C, Osteopontin 9250 C/T, TGFβ1 869 T/C genetic polymorphisms and SIRS and morbidity in on-pump CABG patients

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**Background and Goal of Study:** The systemic inflammatory response syndrome (SIRS) is a marked, generalized response to a wide variety of injuries. Especially after exposure of blood to artificial surfaces of extracorporeal circulation, the activation of cascade systems leads to an inflammatory response, described by Kirklin et al. as ‚whole body inflammation syndrome,' which may be associated with severe organ dysfunctions. Interleukin (IL)-18 Osteopontin, and TGFβ1 are cytokines play number of roles in adaptive and innate immune response.
It is crucial to understand pathophysiology of SIRS to create new prevention or treatment modalities. In the present study, we investigated possible association between Interleukin 18 -607 C/A and -137 G/C Osteopontin 9250 C/T and TGFβ1 T/C genetic polymorphisms and SIRS in on-pump CABG patients. This is the first study that searched Osteopontin gene polymorphisms' effect on SIRS.
**Materials and methods:** After IRB approval, 200 elective CABG patients were recruited prospectively. Patient's possible preoperative predictive factors such as diabetes mellitus, hyperlipidemia, hypertension, COPD, central neural system dysfunctions, tobacco addiction intraoperative risk factors cross clamping, CPB and operation duration, and applied treatments were recorded. DNA isolation was performed from peripheral lymphocytes and genotyping were determined sequence specific PCR and RFLP methods.
**Results and discussion:** ICU stay was 3,1±7,4, 1,28±0,97 IL 18-137 G/C C allele carriers and non-carriers respectively (p:0.003), in IL 18-137 G/C C allele carriers SIRS developed in 48% at the 2nd postoperative day whereas the rate was 31,7 % in non-carriers (p:0.025). SIRS rate at the 2nd postoperative day was 13% and 43,7% respectively in Osteopontin 9250 C/T T allele non-carriers and carriers (p:0.004). WBC counts were higher in day 2 and 3 in Osteopontin 9250 C/T T allele carriers compare to non-cariers (day 2 12,7±4 vs 10.5±2,4 p:0.015; day 3 11,8±4 vs 9,1±4,7 p:0.035).
**Conclusion(s):** This study showed possible relation between IL18-137 G/C and Osteopontin 9250 C/T genetic polymorphism and SIRS and morbidity in on-pump CABG patients.
**References:**
Shaw DM, et al. Novel polymorphism of interleukin-18 associated with greater inflammation after cardiac surgery. Crit Care 2009; 13:R9.
Rosanno Vaschetto et al. Serum levels of osteopontin are increased in SIRS and sepsis. Crit Care 2008; 34: 2176-84.

## 07AP12-1

### Femoral arterial cannulation performed by residents: a comparison between ultrasound-guided and palpation technique in infants and children undergoing cardiac surgery

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**Background and Goal of Study:** Femoral artery cannulation for pediatric cardiac surgeries is indispensable for hemodynamic monitoring and can be technically challenging for anesthesia residents using the traditional palpation technique. We hypothesize that the use of real-time ultrasound may shorten the time to attempted arterial cannulation while decreasing the number of failed attempts and the rate of adverse events.
**Materials and methods:** One hundred six patients under the age of 12, ASA III or IV with congenital heart disease were enrolled in this prospective randomized clinical trial. They were randomly assigned by randomized block design to one of two groups: 1) femoral arterial catheterization by the pulse palpation as landmark technique 2) femoral arterial catheterization by ultrasound guidance. Ten minutes were set as time limit. We then compared the time taken for attempted cannulation by the resident at the first site of arterial puncture while recording the number of attempts, the number of cannulae used and the rate of adverse events on days 1 and 3.
**Results and discussion:** The time of attempted femoral artery cannulation was shorter [173 (60-660) vs 496 (73-720) seconds; P =0.017], and the number of attempts was lower in group US compared with group LM [1 (1-10) vs 2 (1-5); P=0.005]. The number of successful cannulations on first attempt was higher in group US compared with group LM [25/53 (47%) vs 12/53 (22%); P= 0.008]. Time to successful cannulation within 10 minutes was not different between group LM and group US [200 (73-598) and 142 (60-570) seconds respectively; P= 0.237. The number of patients who had a cannula inserted within 10 minutes was 31 of 55 (58%) in the palpation group and 40 of 53 (75%) cases in the US group (P=0.06). None of the patients had adverse events at day one and three.
**Conclusion:** Ultrasound-guided femoral arterial cannulation in children when performed by senior anesthesia residents is superior to the palpation technique based on the reduction of the time of attempted cannulation and the number of attempts, and improvement in first attempt success.

## 07AP12-2

### Cyanotic disease is an independent predictor of FFP and platelets transfusion in cardiac surgery children

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**Background and Goal of Study:** Cyanotic disease is associated with altered platelet function and low fibrinogen level that could increase the risk of bleeding and therefore the exposure to blood products (1).
**Material and methods:** This retrospective observational study was conducted in a tertiary children hospital from 2002 to 2014. Patients who received fresh frozen plasma (FFP) in cardiopulmonary bypass (CPB) priming were excluded. Anaesthesia, CPB and surgery were standardized. Transfusion of red blood cell (RBC), FFP and platelets were compared between acyanotic and cyanotic patients.
Multivariate analysis was used to determine if a cyanotic heart disease predicted the transfusion of FFP or platelets.

**Results:** From the 2113 patients included in the study, 267 were excluded, leaving 1846 patients for analysis, with 1063 patients in the acyanotic and 783 patients in the cyanotic cardiopathy group. Overall, children in the cyanotic group were younger, had a lower weight, a higher ASA and RACHS-1 scores, a higher priming volume, a higher intra-operative fluid balance and longer surgery, CPB and aortic cross clamp times. Preoperatively, children in the cyanotic group had lower platelet count (291.0 vs 328.5 x$10^3$/ml) and fibrinogen level (270.0 vs 285.0 mg/dL) and higher INR (1.1 vs 1.0). RBC were less frequently added in the CPB prime and transfused in the cyanotic group but blood loss was significantly higher.
Overall, more children in the cyanotic group received FFP and platelets transfusions.

| | Acyanotic group | Cyanotic group | P-value |
|---|---|---|---|
| Blood loss | | | |
| Intraoperative blood loss (ml kg-1) | 26.7 (14.8-44.7) | 31.1 (17.6-50.4) | <0.001 |
| Chest tube drainage (total) (ml kg-1) | 16.9 (10.4-26.9) | 31.2 (19.1-51.9) | <0.001 |
| Transfusions | | | |
| RBC in priming | 594 (56.1%) | 304 (39.1%) | <0.001 |
| RBC | 689 (65.0%) | 451 (57.8%) | 0.002 |
| FFP | 61 (5.7%) | 169 (21.6%) | <0.001 |
| Platelet | 23 (2.2%) | 102 (13.0%) | <0.001 |

*[Table 1]*

The presence of a cyanotic cardiopathy was an independent predictor of FFP (OR: 2.08 and 95% CI: 1.44 to 3.01) and platelet transfusion (OR: 3.90 and CI: 2.27 to 6.69).
**Conclusion:** Children with a cyanotic heart disease have an increased risk to be exposed to FFP and platelet transfusion in the perioperative period of cardiac surgery.
**Reference:**
1. Tempe DK, Virmani S. *Coagulation Abnormalities In Patients With Cyanotic Congenital Heart Disease. J Cardiothorac Vasc Anesth. 2002;16:752-65*

## 07AP12-3

### Predictive value of kidney injury molecule-1 for acute kidney injury in pediatric patients undergoing cardiac surgery

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**Background and Goal of Study:** Acute kidney injury (AKI) is a common complication after cardiopulmonary bypass. Till now; serum creatinine level is the standard for diagnosis of AKI. However growing evidence suggests that creatinine is unreliable marker in cases of acute changes in kidney function. kidney injury molecule-1 (KIM-1) is a biomarker introduced recently to predict AKI. We tried to validate KIM-1 in diagnosis of AKI in pediatric patients undergoing cardiopulmonary bypass.
**Materials and methods:** Seventy two pediatric patients scheduled for total correction of acyanotic congenital heart disease were included. Demographic data, serial serum creatinine levels, urine output, were documented. KIM-1 was measured through two urine samples (preoperative and 24-hours postoperative samples) . Diagnosis of AKI was done using KDIGO criteria. Diagnostic value of KIM-1 was determined using area under receiver operating characteristic curve (AUROC).
**Results and discussion:** Among 72 patients , mean age was 27 months, mean weight was 11 kilograms , mean time on CPB was 65 minutes and incidence of AKI was 26.3.AUROC curve which was 0.567, 95% confidence interval (0.444-0.683) . Sensitivity 51.72 and specificity of 72.9, cut of value 421.6 pg/ml .
There were number of characteristics of KIM-1 that led researchers to believe that the protein might make an ideal biomarker of kidney injury: the absence of KIM-1 expression in the normal kidney; its marked upregulation and insertion into the apical membrane of the proximal tubule. In a study to determine the reference ranges of recent biomarkers of AKI, Michael et al showed that the reference range of KIM-1 was (410 pg/ml; IQR 226-703) which is very close to our cut-off value of best sensitivity and specificity. (1)
The limitation to this study is that serum creatinine was measured 24 hours after the operation which might have missed some patients with acute kidney injury. But we chose that because at 72 hours, some patients may have been lost due to discharge from ICU.
**Conclusion(s):** KIM-1 has weak sensitivity and specificity in detecting acute kidney injury in pediatric cardiac patients undergoing surgery under CPB in this cohort.
**Reference:**
1. Bennet M., Nehus E. ,et al , 2015. Pediatric reference ranges for acute kidney injury biomarkers. *Pediatric Nephrology ;*30(4):677-685.

## 07AP12-4

### Predictors of postoperative hyperglycemia after pediatric cardiac surgery - a single centre retrospective cohort study

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**Background:** Hyperglycemia in infants after cardiac surgery for congenital heart disease is a common issue. Poor glycemic control is reported to be associated with adverse postoperative outcomes such as longer hospital stay and higher mortality[1], but conflicting study also exists[2]. This study is aimed to investigate clinical factors contributing to hyperglycemia in perioperative period.
**Methods:** We performed a single centre retrospective cohort study. From January 2012 to November 2015, 48 infants (aged 1 to 12 months) underwent cardiac surgery with cardiopulmonary bypass (CPB). We defined hyperlgycemic group as blood glucose ≧ 250 mg/dl on ICU admission. Clinical background, operative factors and postoperative factors were compared between hyperglycemic group and euglycemic group. Data are presented as mean ± SD, and comparison was made by unpaired t test. Addtionally, multivariable analysis was performed to find factors that influences hyperglycemia.
**Results and discussion:** In 48 patients, the number of hyperglycemic group was 13 (27.1%) and of euglycemic group was 35 (72.9%). Hyperglycemic group showed significantly smaller body weight (4.4 ± 3.5 vs 6.4 ± 2.7 kg), higher rate of chromosomal abnormality (46.2 ± 3.8 vs 14.3± 1.0 %), longer CPB time (5.5 ± 1.5 vs 2.4 ± 1.0 hour), higher peak lactate level (3.3 ± 0.9 vs 2.4 ± 0.8 mmol/L) and higher catecholamine index (11.3 ± 5.1 vs 4.5 ± 2.2). Glucose intake and methylprednisolone dose during operation were not different between two groups. Multivariable analysis revealed chromosomal abnormality, peak lactate level and catecholamine index were predictive factors of hyperglycemia. Hyperglycemia was significantly associated with longer postoperative mechanical ventilation (3.2± 1.2 vs 1.4 ± 1.3 days).
**Conclusion:** Higher catecholamine dose, higher lactate level, longer CPB time, smaller body weight and chromosomal abnormality were detected as predictors of high blood glucose at ICU admission. Hyperglycemia was shown to be associated with longer mechanical ventilation time.
**References:**
1. Polito, A. et al. Association between intraoperative and early postoperative glucose levels and adverse outcomes after complex congenital heart surgery. Circulation 118, 2235-2242 (2008).
2. Rossano, J. W. et al. Glycemic profile in infants who have undergone the arterial switch operation: Hyperglycemia is not associated with adverse events. J. Thorac. Cardiovasc. Surg. 135, 739-745 (2008).

## 07AP12-5

### Early extubation strategy in a paediatric cardiac surgery program

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**Background and Goal of the Study:** Paediatric cardiac surgery programs show situations compromising sustainability such as: ventilator associated infections, prolonged in-hospital length of stay (LOS) or prolonged intubation periods. Our main goal was to demonstrate that instituting an early extubation (EE) program can make our results more efficient.
**Material and methods:** We included patients of all RACHS-1 score levels operated in the KARDIAS / ABC project from August 4th 2012 thru October 10th 2015. A pre stablished anaesthetic plan was based on intra operative dexmedetomidine-opioid infusion and pre-sternal closure bilateral intercostal nerves instillation (ropivacaine). Postoperative analgesia was based on opioid continuous infusion (low dose fentanyl) and sedation with dexmedetomidine. Criteria to consider the possibility of EE were:
1. Weight > 10 Kg.
2. Lactate <3 mmol/L.
3. No Down's Syndrome.
4. Acid-Base equilibrium.
5. No evidence of ventricular dysfunction on echocardiogram.
6. Age > 30 days.
7. DCP time length <90 minutes.
The following definitions were established: Extubation in the operating room (EOR): Done in the OR; Early Extubation: Done in the paediatric cardiac intensive care unit (PCICU) in the first 24 hours; Late Extubation (LE): Done after the first 24 hours; Re-intubation: Requirement of new intubation either in the operating room or at any moment after the extubation in the PCICU.
**Results and discussion:** 171 patients were included. EOR was achieved in 65.4% (112) and EE in 87.1% (149) Mean ICU-LOS for EE group was 3.3 days and for non EE 13.0 days (p<0-001) In hospital-LOS for EE group was 5.9 days and for non EE 16.7 days (p<0.0001) Infection percentage was 5% for EE group and 19% for non EE group. Neither mortality nor re-intubation were observed in the EE group.
**Conclusions:** Early extubation strategy promoted efficiency in our congenital heart surgery program. Careful patient selection criteria along with predefined anaesthetic plan and a postoperative sedation / analgesia strategy are also required to reduce the possibility of reintubation. Special attention to adequacy of pain control and sedation is recommended in order to reduce reintubation or other complications.
**Acknowledgements:** The authors would like to acknowledge the invaluable collaboration of the nurse staff of the PCICU in the KARDIAS /ABC project.

## 07AP12-6

### Angiopoietin-1 mimetic restores microcirculatory perfusion after cardiopulmonary bypass in a rat model

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**Background and Goal of Study:** Cardiopulmonary bypass (CPB) during cardiac surgery impairs microcirculatory perfusion and is paralleled by microvascular leakage. The Angiopoietin/Tie2 system might preserve endothelial barrier function and attenuate microvascular leakage. This study investigated the effects of an Angiopoietin-1 mimetic on microcirculatory perfusion in a rat CPB model.
**Materials and methods:** Male rats were subjected to 75 minutes of CPB after treatment with an angiopoietin-1 mimetic (Ang1mim; n=5) or PBS (n=5). Intravital microcirculatory perfusion was measured in the cremaster muscle at baseline and five time points until 60 minutes after CPB.
**Results and discussion:** Onset of CPB resulted in comparable haematocrit levels (21.0±1.0%, P=0.02 and 18.8±0.9%, P<0.001) in the PBS and Ang1mim groups, respectively. In the PBS group, this was accompanied by reduced proportion of perfused capillaries from 86.6±2.6% to 59.5±5.3% P=0.002 and increased number of stopped vessels from 12.1±3.1% to 40.1±5.1% P=0.002, which progressed after CPB. In contrast, Ang1mim pretreated rats showed minimal reduction in perfused vessel proportion during CPB from 93.5±2.2% to 79.4±3.7% P=0.01 which restored after CPB to 80.9±5.9% P=0.07 vs. baseline. Moreover, CPB-induced stopped vessels returned to baseline one hour after weaning from CPB in the Ang1mim group from 5.1±2.2 to 18.3±6.0 P=0.07 after CPB.
**Conclusion(s):** Intervening with an Angiopoietin-1 mimetic attenuates and restores CPB-induced microcirculatory perfusion disturbances suggesting that therapeutic targeting the Angiopoietin/Tie2 system may contribute to preserved microcirculatory function during extracorporeal circulation.

## 07AP12-7

### Effects of isoflurane post-conditioning on myocardial connexin 43 expression in rats

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**Background and Goal of Study:** Connexin 43 (Cx43) is a gap junction protein located mainly in the ventricular myocardium which plays an important role in intercellular electrical conduction. Studies have shown that volatile anesthetic postconditioning reduce the incidence of ventricular arrhythmias. Therefore, the aim of this study was to investigate weather isoflurane post-conditioning has the effect on the connexin 43 expression in ventricular myocardium and infarct zone.
**Materials and methods:** Ischemia was induced in Sprague-Dawley female rats for 30 minutes. Starting from the last 5 minutes of ischemia up until 10 minutes into reperfusion time, the isoflurane group (n=8) recieved 1 MAC of isoflurane, while the control group (n=8) received only an air/oxygen mixture. The animals were left to survive 4 days (subacute phase) or 14 days after reperfusion (chronic phase of infarct healing). Colocalization of Nestin and Cx43 antibodies was used as a marker of "de novo" formed myoblasts from progenitor cells. For statistical comparison between groups we used t-test.
**Results and discussion:** In subacute phase of infarct healing the percentage (mean ± SD) of Cx43 expression in myocardium was significantly higher in isoflurane treated animals (0.0093 ± 0.0016 % area) in comparison to the control group (0.0038 ± 0.0034 % area), p=0.042.
However, when comparison of infarct zone was done p was 0.050 (0.0051 ± 0.00074 vs. 0.0034 ± 0.0011 % area). In the chronic phase of infarct healing, the Cx43 expression in myocardium (p=0.987; 0.025 ± 0.034 vs. 0.025 ± 0.035 % area) and infarct zone (p=0.104; 0.0049 ± 0.0013 vs. 0.0034 ± 0.00074 % area) was not significantly different between isoflurane post-conditioned vs. control groups, respectively. Colocalization of Nestin and Cx43 was observed in newly formed myocytes, indicating their connection with existing mature myocytes.
**Conclusion(s):** Isoflurane treated animals had an early phase augmentation of Cx43 expression in myocardium.

## 07AP12-9

### The association of genetic polymorphisms with acute kidney injury after cardiac surgery in an Asian population

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**Background and Goal of Study:** Acute kidney injury (AKI) is a serious complication after cardiac surgery affecting up to 30% of patients. Clinical factors alone cannot reliably predict AKI after cardiac surgery. Ethnicity has been shown to be a predictor of AKI in the Western population with African Americans having a higher risk compared to their Caucasian counterparts.[1] Our published study also demonstrated a race effect with Indians and Malays having a higher risk of developing AKI after cardiac surgery compared to Chinese.[2] Ethnicity and genetic heterogeneity in pathways regulating vascular and inflammatory responses to injury may explain the individual variability in susceptibility to AKI.

**Methods:** 975 patients who underwent cardiac surgery from 2008-2010 were recruited. Exclusions included patients who were dialysis dependent, and not of Chinese, Malay or Indian ethnicities, leaving 870 eligible patients. The clinical outcome was AKI, based on the AKIN criteria. Genetic polymorphisms in 4 candidate genes, namely angiotensin-converting enzyme (ACE), apolipoprotein E (ApoE), interleukin-6 (IL-6) and tumour necrosis factor-alpha (TNF-α) were analyzed for their associations with AKI in our population. Analysis was done using Poisson regression model for multivariate analysis.
**Results:** Overall, 42.5% of our patients developed AKI. A higher proportion of non-Chinese developed post-operative AKI at 50.2% compared to only 39.3% of Chinese ($p=0.003$). The ACE-D allele was associated with AKI among the Chinese but not among the non-Chinese. The non-Chinese were more likely to have the TNF-α-308GG genotype but were less likely to have non-apoE ε4 alleles and IL-6-572C alleles.
**Conclusion:** Ethnicity and genetic differences contribute to the variability in AKI rates after cardiac surgery. The ACE D allele has been linked to increased renal vasoconstriction and is associated with AKI in the Chinese. However, other candidate polymorphisms did not have an association with AKI. Newer genome wide analysis may enhance our knowledge of the role of genetics in causation of AKI after cardiac surgery.
**References:**
1. Stafford-Smith M et al. Am J Kidney Dis 2005
2. Chew ST et al. Br J Anaesth. 2013

## 07AP12-10

### An enormous giant paravertebral synovial sarcoma extending to thoracic cavity obscuring mediastinum

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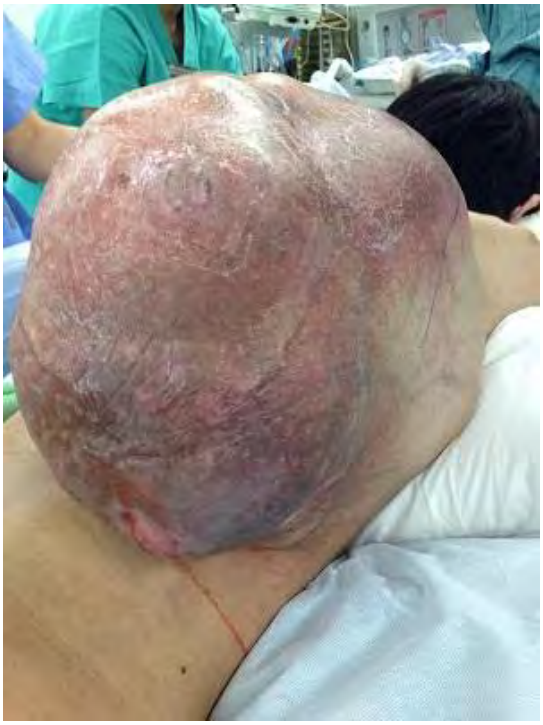
**Background:** Synovial sarcoma is a rare sarcoma with distinct morphologic and genetic features.
**Case report:** A 20 year male was scheduled for debulking of massive giant back tumour. Relevant points preopertaively: a huge back tumour resulting the ONLY COMFORTABLE DEFAULT POSITION of the patient to be PRONE.



*[Preanesthesia default position]*

Able to sit with extreme forward bending and unable lie in supine position due to this enormous size of the tumour. The tumour extended into thoracic cavity, completely obscuring right hemithorax and majority of left hemithorax, invading intercostal spaces, pleura ribs and metastatic foci in right upper lobe of lung and left pneumothorax.
The anaesthetic challenges: insertion of invasive lines and anaesthesia induction in prone position, positioning, massive haemorrhage and post-operative intensive care. We secured two 14G peripheral venous access and arterial cannulation under local anaesthesia prior to induction. Intubation was aided conveniently with use of videolaryngoscope under anaesthesia and muscle relaxation as it was possible to turn head to either side. Similarly, central venous line was inserted in prone position, in left IJV under ultrasound guidance after anaesthesia induction without difficulty.
Surgery involved extremely difficult dissection due to the size and extreme vascularity by the multiple feeding vessels. Massive blood and blood products transfusion were needed. Due to massive haemorrhage there had been episodes of peri-arrest requiring intermittent boluses of adrenaline while coping up with blood transfusion using Level-1 transfusor system. Vac dressing was applied by the plastic surgeons for the skin defect which was subsequently closed by local flap 1 week later. Postoperatively, we transferred to intensive care and was extubated 12 hours later.
**Discussion:** We conclude successful management of this complex case with importance of excellent team work.
**References:** Primary mediastinal synovial sarcoma with transdiaphragmatic extension presenting as a pericardial effusion. Korula A et al. Singapore M J2009; 50(1): e26
**Learning points:** These are challenging for the entire team and it demonstrates importance of the competence of entire team.

## 07AP12-11

### Unexpected traqueal bronchus in a limb-girdle muscular dystrophy patient

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**Background:** Limb-Girdle Muscular Dystrophy (LGMD) is a myopathic disorder caused by alterations in genes required for normal muscle function[1]. Tracheal bronchus (Tb) is a congenital anomaly where the right upper lobe bronchus originates in the trachea rather than distal to the carina[2]. We describe the anesthetic management for thoracoscopic sympathectomy in a patient with LGMD type 2A and an unknown Tb.
**Case report:** 22 yr, male, ASA III, with LGMD manifested only by muscular features of the disease, scheduled for thoracoscopic sympathectomy. A Malignant Hyperthermia prevention (MH) protocol was used. The procedure was done under general intravenous anesthesia (propofol, remifentanil) and neuromuscular blockade (NMB) maintained with rocuronium. Monitorized with ASA standard plus anesthesia depth and NMB. After intubation with standard tracheal tube and surgical positioning, we inserted an EZ-BLOCKER™ under bronchoscopic guidance, during which we observed the presence of a Tb that made lung isolation impossible using this device. Patient was repositioned and a 39Fr left double lumen tube placed. Surgical procedure was done uneventfully including the lung isolation techniques. Analgesia (intravenous and pleural local anesthetic instillation) and nausea and vomiting prophylaxis was done, and NMB reverted with sugammadex. Patient remained for 24h in vigilance in the post-anesthesia care unit and was discharged home in the 5$^{th}$ postoperative day.
**Discussion:** LGMD has a prevalence ranging from 1:45,000 to 1:123,000. Two main types were described (1, 2), from which the type 2A is the most common. Anesthetic management includes some critical points to consider: susceptibility to MH; sensibility to sedative-hypnotics; possible airway management complications; high incidence of cardiac involvement; attention to type, dose, monitoring and adequate reversal of NMB[1]. Tb is a congenital anomaly with an incidence from 0,001% to 2%[2]. The association between these anomalies has not previously been described. This case involved the management of a LGMD patient with an unexpected Tb, which demanded an unexpected change in the lung insolation technique needed for the thoracoscopic sympathectomy.
**References:**
Anestezlojogia i Ratownictwo 2013;7:397-400
Otolaryngol Head Neck Surg 2002;126:204-3
**Learning points:** Anesthetic management of neuromuscular disorders has several critical points to consider and unexpected/undescribed associations should be expected.

## 07AP12-12

### Is the use of PEEP during one lung ventilation safe in the patients with COPD undergoing thoracic surgery?

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**Background and Goal of Study:** Use of PEEP during OLV (one lung ventilation) in patients with chronic obstructive lung disease (COPD) is controversial. The BODE index is multidimensional grading system in COPD and it better defines the systemic effects of COPD on patients, than $FEV_1$ only. BODE index is formed as the sum of points assigned to each of the acronym BODE lettered variables and expresses a numerical range from 0 through 10. What is BODE index greater pulmonary function deteriorates.
The goal of this study was to explore what is the impact of the application of the PEEP on OLV in patients with COPD in relation to their BODE index.
**Materials and methods:** After obtaining approval of our Ethical Rewiev Bord and written informed consent, 137 patients ASA class II-III with a lung cancer and COPD in history scheduled for lobectomy.They were divided in six groups and given the BODE index. BODE Group 0 had the best lung function unlike BODE Group 5, which had the worst lung function.
The patients were intubated with left Robertshow tube. After placing the patient in the lateral position, OLV was performed. During OLV, patients were ventilated pressure-controlled ventilation (PCV) with Vt 7 ml/kg, $FiO_2$ 0,7. After that, in all patients PEEP was gradually increased every 15 minutes for 2 $cmH_2O$ (0-8 $cmH_2O$).
Data from arterial blood gases were taken 15 minutes after starting OLV, before PEEP and 15 minutes after PEEP 2, 4, 6, 8 $cmH_2O$.
**Results and discussion:** In our patients BODE index was 0-5. BODE index 0 had 29 patients, BODE index 1 had 39 patients. The most patients had BODE index 2. BODE index 3 had 17 patients, only 3 patients had the largest measured BODE index 5. After gradually increased PEEP in our patients, there was no statistically significant effect on systolic, diastolic and mean arterial pressure.
Optimal PEEP with which we have achieved the best oxygenation, ventilation and stability of circulation for groups BODE 0-3 was 8 $cmH_2O$, for BODE 4 group was 6 $cmH_2O$. Only three patients, group BODE 5, had optimally $SaO_2$ with PEEP 2 $cmH_2O$.
**Conclusion:** Use of PEEP during OLV in patients with COPD undergoing lobectomy, whose BODE index is not greater than 5 is safe and provides optimal oxygenation and ventilation.
**Reference:**
1. Hofman N, Canales C, Leduc M, Mahajan A. Positive end expiratory pressure during one-lung ventilation: selecting ideal patients and ventilator setting with the aim of improving arterial oxygenation. Ann Card Anaesth 2011; 14:183-7.

## 07AP13-1

### Left anterior descending coronary artery remodelling by dronedarone. Study of function

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**Background and Goal Study:** Dronedarone is a multichannel blocker similar to amiodarone, but with less secondary effects and a better safety profile([1]). Its only indication so far is that of an antiarrhythmic agent. Due to its action over multiple channels, our group raised what changes might induce dronedarone in the function of left anterior descending coronary arteries in an experimental model of arterial hypertension.
**Materials and methods:** Adult male spontaneously hypertensive rats (SHRs) were randomly divided into dronedarone therapy group (SHR-D, n= 9) and placebo group (SHR, n=9). Wistar Kyoto rats were used as normotensive controls (WKY n= 9). After 15 days of intervention (during which cardiac frequency and arterial tension were registered), left anterior descending coronary arteries were dissected to study their function. Segments of each artery were mounted on a wire myograph and concentration-response curves to 5-hydroxytryptamine (5-HT) were performed ($3x10^{-8}$ to $3x10^{-5}$ mol/L) to assess vasoconstrictor function. Vasodilator function was also evaluated with increasing concentrations of acetylcholine (Ach $10^{-9}$ to $10^{-4}$ mol/L) in segments precontracted with serotonine (5-HT $3\times10-7$ mol/L). Comparisons among groups were made by ANOVA test of repeated measures. All date were expressed as mean ±SEM. $P<0.05$ was considered significant.
**Results and discussion:** Dronedarone decreased cardiac frequency compared to untreated rats. It also decreased arterial tension compared to SHR, with no statistical differences between SHR-D and WKY. SHR-D showed a greater vasodilator response compared to SHR at low doses of acetylcholine ($10^{-9}$ to $10^{-7}$ mol/L). SHR displayed a greater vasconstricting response to 5-HT ($3x10^{-8}$ to $3x10^{-5}$ mol/L) than WKY. Dronedarone decreased the vasoconstricting response in SHR-D compared to SHR ($10^{-7}$ to $3x10^{-5}$ mol/L). No statistical differences were observed between WKY and SHR-D at all 5-HT concentrations.
**Conclusions:** Dronedarone might produce a regression in left anterior descending coronary artery by increasing its vasodilator function and decreasing its vasconstrictor responses compared to untreated spontaneously hypertensive rats.
**Reference:**
1. *Dronedarone* Chinmay Patel, MD; Gan-Xin Yan, PhD; Peter R. Kowey, MD. Circulation. 2009;120:636-644.
**Acknowledgements:** This work was supported by a grant from FIS 13/01261 and Fondos FEDER, Spain.

## 07AP13-2

### Non-cardiac surgery in patients with ventricular assist devices: our experience in Puerta de Hierro University Hospital, Madrid

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**Background:** The calculated risk of developing a heart failure is around 20% in the American population above 40 years old. It affects at 1-2% of the global population and above 75 years old its prevalence raises up to 10-20%. Eventhough the surviving rates are being modified, currently is about 50% to five years. We present two cases of patients with VAD undergoing surgery.
**Case report:**
1: Left VAD (Berlin heart) in dilated cardiomyopathy.Emergency laparotomy for an open appendicectomy. Haemodynamically stable. Not bleeding, Transfusion of 1 platelet pool. Enoxaparin suspended. 500mL colloids, 1,5L crystalloids. Extubated in ICU after 4 hours. The day after the acetylsalicylic acid, dipiridamol, and sodic heparin are initiated. Discharge 3 days after.
2: Biventricular AD (berlin heart) in hipertrofic cardiomyopathy in dilated phase. Hospitalized for a laparoscopic cholecystectomy. Tendency to hypotension requiring noradrenaline and volumen. Not intraoperatory bleeding, 2L crystalloids. Admission in ICU haemodinamically stable and extubated. Transfusion of red cells in postoperatory. The day after the surgery, sodic heparin is initiated. Discharge 24hs after.
**Discussion:** There is not a lot of available information about the intraoperatory management. The presence of these sets, added to the usual comorbidities enhance the possibility of complications. We can see the importance of understanding the correct placement of the cannulas during the intervention avoiding their kincking so the cardiac output is the adequate, the accurate managment of anticoagulants and antiplatelet and the correct volumen management to maintain good preload.
**References:**
1. Kristensen, S; Knutti, J; Saraste A et al. 2014 ESC/ESA guidelines on non cardiac surgery: cardiovascular assessment and Management. European Heart Journal (2014) 35; 2383-2431.
2. Delgado M; Bernabeo, G; Hernán, D; Avances en asistencias circulatorias mecánicas. University Health Network.Canada.
3. Gómez Bueno, M; Segovia, J; Alonso-Pulpón, L. Asistencia mecánica circulatoria y trasplante cardiaco. Indicaciones y situación en España. HUPH. España.
**Learning point:** In brief, we should create protocols for the correct anaesthetic management of patients with VAD. We have to understand the managment so if a complication shows up we know how to deal with it inmediatly.The two most relevant points during the intraoperatory are the manteinance of a good preload and the correct colocation of the cannulas.

## 07AP13-3

### Effect of perioperative sodium bicarbonate on postoperative acute kidney injury in infective endocarditis patients

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**Background and Goal of Study:** Acute kidney injury (AKI) following cardiac surgery is associated with inflammation, oxidative stress, and oxygen free radicals. Patients with infective endocarditis (IE) have a high risk of AKI due to systemic inflammation and infection. Sodium bicarbonate has intrinsic natriuretic effects and ability to alkalize tubular fluid, increasing oxygen delivery and reducing oxidative stress by free radical formation. We investigated whether perioperative sodium bicarbonate infusion could attenuate AKI in IE patients undergoing valvular heart surgery.
**Materials and methods:** Sixty IE patients undergoing cardiac surgery were randomly assigned to placebo (n = 31) or to bicarbonate (n = 29) groups. Sodium bicarbonate was administered at a loading dose of 0.5 mmol/kg for 1 h commencing with anesthetic induction, followed by an infusion rate of 0.15 mmol/kg/h for 23 h. The primary endpoint was the incidence of AKI during the first postoperative 48 h. Serum creatinine level and glomerular filtration rate during the postoperative 5 days, and major morbidity endpoints were assessed.
**Results and discussion:** The incidence of AKI based on *Acute Kidney Injury Network* criteria was 7 (23%) in the control group and 9 (31%) in the bicarbonate group ($P$ = 0.459**)**. The group × time interactions on serum creatinine level and estimated glomerular filtration rate (eGFR) were not statistically significant between groups in the linear mixed-model analysis ($P$ = 0.077 and 0.083, respectively). The incidences of major morbidity endpoints were not different between the groups.

| AKIN classification | Control group (n = 31) | Bicarbonate group (n = 29) | P-value |
|---|---|---|---|
| None (n) | 24 (77%) | 20 (69%) | |
| Stage 1 (n) | 6 (19%) | 5 (18%) | |
| Stage 2 (n) | 1 (3%) | 2 (7%) | |
| Stage 3 (n) | 0 | 2 (7%) | |
| Any category | 7 (23%) | 9 (31%) | 0.459 |

*[Table. Incidence of postoperative acute kidney inj]*

**Conclusion(s):** Perioperative sodium bicarbonate administration was not found to reduce the incidence of AKI in IE patients undergoing cardiac surgery.

## 07AP13-4

### Does supplementation by the Surgical Apgar Score improve the prognostic accuracy of the Revised Cardiac Risk Index?

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**Background and Goal of Study:** The Revised Cardiac Risk Index (RCRI) is a validated index that uses preoperative data to predict postoperative cardiac complications with moderate accuracy. The Surgical Apgar Score (SAS) is a validated prognostic index based on intraoperative factors (hypotension, bradycardia, estimated blood loss). We conducted a retrospective cohort study to determine if combining the 2 indices allows for more accurate estimation of perioperative cardiac risk.
**Materials and methods:** Following research ethics approval, we conducted a retrospective cohort study of adults (≥18 y) who underwent major elective noncardiac surgery from 2009-2014 at the Toronto General Hospital (Toronto, ON, Canada). The exposure variables were the RCRI (classified as 0, 1, 2 or ≥3) and SAS (classified as 0-2, 3-4, 4-5, 6-7, 7-8, or 9-10). The primary outcome was myocardial injury, defined a postoperative elevation in troponin I above the 99th percentile.
We assessed the correlation between the RCRI and SAS using the Spearman rho. The area under the curve (AUC) of the receiver-operating characteristic (ROC) curve was used to measure the association of the RCRI and SAS with myocardial injury.
Finally, ROC curve and net risk reclassification analyses were used to assess if combining the RCRI and SAS resulted in more accurate prediction of myocardial injury. Four risk categories (<1%, 1-5%, 5-10% and >10%) were used for reclassification analyses.
**Results and discussion:** The cohort included 16,841 patients, of whom 183 (1.1%) had myocardial injury. The proportions with RCRI scores of 0, 1, 2 and ≥3 were 46.5%, 38.9%, 11.3% and 3.3% respectively. The proportions with SAS of 0-2, 3-4, 4-5, 6-7, 7-8, and 9-10 were 0.5%, 4.4%, 21.3%, 55.3% and 18.6% respectively. There was weak correlation between the RCRI and SAS (rho 0.13; 95% CI 0.12-0.15). As individual indices, the RCRI (AUC 0.73; CI 0.70-0.76) predicted myocardial injury better than the SAS (AUC 0.63; CI 0.59-0.67). The combination of the indices resulted in improved predictive accuracy (AUC 0.77; CI 0.74-0.80) than the RCRI (P<0.001). The improvement was driven by better risk classification of the 16,658 patients without myocardial injury (net 1328 patients reclassified to lower risk categories).
**Conclusions:** Supplementation of a preoperative index (RCRI) with data from an intraoperative index (SAS) results in improved estimation of perioperative cardiac risk. Further research is needed to confirm these findings.

## 07AP13-5

### Low hematocrit on ICU admission is a risk factor of long term outcome in patients who required prolonged mechanical ventilation after cardiovascular surgery. A single center retrospective cohort study

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**Background:** The Transfusion Requirement After Cardiac Surgery (TRACS) study showed that restrictive perioperative red blood cell transfusion strategy is as safe as a liberal strategy in patients undergoing elective cardiac surgery[1)]. However, it is unknown whether restrictive perioperative red blood cell transfusion is safe in a subgroup of patients who required prolonged mechanical ventilation (PMV) after cardiovascular surgery, which is one of the risk factors of poor outcome[2)].
**Methods:** We retrospectively collected patient's data at Yokohama City University Medical Center using National Clinical Database from 2008 to 2012. We enrolled patients who required mechanical ventilation for more than 72 hours after cardiovascular surgery. Patients were categorized into two groups according to the hematocrit (Ht) on ICU admission; equal or more than 30% (≥30%) (Group H) or Ht less than 30% (Group L). The Mortality of two groups was compared using Kaplan-Mayer technique and Log-rank test. To determine the predictor of 1-year mortality, we identified factors with significant difference by univariate analysis and performed the multivariate analysis using them.
**Results and discussion:** Out of 252 patients, data from 187 patients were collected. Ninety-two and 95 patients were classified as Group L and H, and their mean (±standard deviation) Hematocrits were 33.79% (±3.56) and 26.70% (±2.44), retrospectively. One-year mortality between the two groups was significantly different with Kaplan-Mayer technique (P=0.014). Multivariate analysis revealed that seven factors were correlated with 1-year mortality (Table 1). Ht ≥30% on ICU admission may be associated with improved long-term mortality, even after other factors that may influence Ht such as gender and blood loss were considered. The apparent discrepancies between TRACS study[1)] and the present study may be because our study incorporated only those who required PMV.
**Conclusion:** Our retrospective analysis suggests that in patients who required PMV after cardiovascular surgery, 1-year mortality was low in the group with Ht ≥30% on ICU admission. Further studies are required to comfirm our results.
**References:**
1. Hajjar LA, Vincent JL, Galas FR, et al. Transfusion requirements after cardiac surgery: the TRACS randomized controlled trial. JAMA. 2010;304:1559-67.
2. Van Caenegem O, Jacquet LM, Goenen M. Outcome of cardiac surgery patients with complicated intensive care unit stay. 2002;8:404-10.

## 07AP13-6

### Can dronedarone change intramyocardial arteries structure? Experimental study on hypertensive rats

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**Background and Goal Study:** Dronedarone is a multichannel blocker similar to amiodarone, but with less secondary effects and a better safety profile ([1]). Its only indication so far is that of an antiarrhythmic agent. Due to its action over multiple channels, our group raised what changes might induce dronedarone in the structure of intramyocardial arteries in an experimental model of arterial hypertension.
**Materials and methods:** Adult male spontaneously hypertensive rats (SHRs) were randomly divided into dronedarone therapy group (SHR-D, n= 7) and placebo group (SHR, n=7). Wistar Kyoto rats were used as normotensive controls (WKY n= 7). After 15 days of intervention (during which cardiac frequency and arterial tension were registered), histological sections were prepared by staining with orcein for studying intramyocardial branch of obtuse marginal artery. The following variables were studied: external diameter (ED), wall width (WW) and cross sectional area (CSA). Comparisons among groups were made by ANOVA test of one factor with Bonferroni's correction. All data were expressed as mean ±SEM. $P<0.05$ was considered significant.
**Results and discussion:** SHR group showed a greater WW and CSA than WKY group ($p<0.001$). Dronedarone produced a decrease in WW and CSA compared to SHR ($p<0.05$), without statistical differences in external diameter. Wall width was similar between WKY and SHR-D.
**Conclusions:** Dronedarone might produce a regression in intramyocardial arteries' remodelling by changing their structure compared to untreated spontaneously hypertensive rats.
**Reference:**
1. *Dronedarone* Chinmay Patel, MD; Gan-Xin Yan, PhD; Peter R. Kowey, MD. Circulation. 2009;120:636-644.
**Acknowledgements:** This work was supported by a grant from FIS 13/01261 and Fondos FEDER, Spain.

## 07AP13-7

### Pain modulation prodile prdict patient delay in seeking medical help in acute myocardial infarction

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**Background and Goal of Study:** Rapid reperfusion is crucial to reduce mortality in patients with ST-elevation myocardial infarction (STEMI). Prehospital patient delay, defined as time from symptoms onset to the decision to seek medical attention, accounts for a large proportion of cases with delayed reperfusion. However, whether altered pain modulation processes affect less severe pain symptoms and consequentely prolonger delay needs further illumination.
We explored whether prehospital patient delay is affected by a reduction of perceived pain perception and pain modulation response.
**Materials and methods:** Facilitatory and inhibitory pain modulation pathways assessed by psychophysical tests of temporal summation and conditioned pain modulation (CPM) as well as sensation and pain thresholds, magnitude estimation of supra-threshold stimulation. Pain recalls at the onset of chest pain were obtained in 67 STEMI hospitalized patients. The associations between these measures and chest pain intensity and duration of patient delay were explored.
**Results and discussion:** Among all psychophysical pain measures only warm sensation threshold was independently associated with lower clinical chest pain intensity ($p = 0.01$).
Multivariable regression analysis ($R^2 = 0.449$; $P<0.0001$) revealed an inverse independent association between chest pain intensity ($P<0.001$) and patient delay whereas efficient CPM was positively associated with prolonged patient delay ($P = 0.034$). The electrocardiography-derived myocardial ischemic area at risk for necrosis was not associated with chest pain intensity or patient delay. Beyond the perceived chest pain intensity, patients who exhibit efficient response of the descending inhibition pathways have prolonged delay in seeking medical help after the onset of chest pain during acute coronary occlusion.
**Conclusion(s):** The findings emphasize the significant role of the individual pain modulation profile and may suggest new venue to identify patients with susceptibility to experience less pain and less hazard signal and consequently delay in seeking medical help.

## 07AP13-8

### Anesthetic implications in coronary artery bypass grafting after left pneumonectomy. Case report

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**Background:** Typically the pneumonectomy space contracts by shift of mediastinum, elevation of diaphragm and crowding of ribs on the side of pneumonectomy. These changes can make surgical access to mediastinal structures through the median sternotomy awkward and difficult. It is well known that the use of cardiopulmonary bypass (CBP) negatively affects pulmonary function. Another consideration is the ability to establish CPB. Difficulty during cannulation may also be considered.
**Case report:** A 72-year-old man with left pneumonectomy 9 yrs before (carcinoma). Preoprative: room air PaO2 76 mmhg, PaCO2 40 mmHg, pH 7.46. FEV1 1.20 l (33% predicted) FVC 1.80 (38% prd) FEV1/FVC 0,66 (80% prd).
Hemodynamics: distal left main trunk disease and multivessel disease, apical akinesis, and anterobasal anterolateral hypokinesia with moderate to severe depression of LVEF (EF 35%).
He was scheduled to CABG x3 trhough left anterior thoracotomy, initially off-pump, but considering his respiratory and cardiological situation an arterial and venous cannulation were placed in order to emergent CBP. (Left femoral artery, right internal jugular and left femoral veins as standard of Heartport surgery).
Surgery was done off-pump (OPCABG) without incedences and a CABG x3 was performed with saphenous vein sequential to left subclavian artery.
He needed an inotropic support with dobutamine (4 mcgr/kg/min) and was transferred to Critical Care Unit. He was extubated 6h later. After 3 days he was discharged.

**Discussion:** Pneumonectomy incurs marked anatomical changes in the thorax. This may necessitate deviations from standard protocols regarding open-heart surgery.
Prior pneumonectomy poses several special challenges and considerations in the approach to cardiac surgery, especially regarding exposure, line placement for CBP, attention to avoiding diaphragmatic dysfunction, and choice of bypassing conduit if CABG is to be performed.
If OPCABG is to be performed, we do not need to access the central venous system for the preparation of cardiopulmonary bypass, and we can determine the operative strategy as we preferentially consider the accessibility to target coronary vessels.
**Reference:**
Sanjay V Ghotkar. Cardiac surgery in patients with previous pneumonectomy (Journal of Cardiothoracic Surgery 2008, 3:11)
**Learning points:** Coronary artery bypass graft surgery (CABG) is a challenge in patients with prior pneumonectomy, because of the decreased pulmonary function and anatomical shift of the heart.

## 07AP13-9

### Intra-arterial cocaine injection: a challenge to anesthesiologist and surgeon

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We present a case of a 34 years old men with right inferior limb signs of acute isquemia proposed to emergency tromboembolectomy. He had a known history of injectable drug abuse and was HIV positive.
At physical examination the patient was confused, agitated, obnubilated with miotic pupils.
His presenting blood pressure was 205/110 mmHg with a heart rate of 93 bpm. Pulse oximetry was 98%.
Right inferior limb was numb, ice-cold, pale and paralysed with bluish hue until the inguinal area. Right femoral pulse was palpable, but not the popliteal or distal pulses. The right inguinal region had signs of repeated punctures.
At the operating room 4 mg of midazolam were administered.
Rapid sequence induction was achieved with 150 mcg of fentanyl, 200 mg of propofol and 100 mg of rocuronium. Orotraqueal intubation was successful and anesthesia was maintained with sevoflurane and remifentanil. Blood pressure was lowered with a perfusion of nitroglycerine.
The patient was monitored according the ASA standarts plus invasive arterial pressure with a catheter in the left radial artery.
After multiple unsuccessful attempts at surgical revascularization, without any embolus removal, acute isquemia was interpreted as major vasospasm caused by intraarterial cocaine injection.
A catheter was introduced till the maleollar region and direct incremental intraarterial injection of nitroglycerine was performed (total dosage = 17,5 mg). Injection was performed according to the tensional profile of the patient. The lowest arterial pressure was 132/82 mmHg, when the injection was stopped.
At the end of the procedure both right popliteal and dorsalis pedis were palpable.
Postoperative analgesia was achieved with tramadol 100 mg, paracetamol 1g and local infiltration with ropivacaine 0,75% 10 mL.
Intraarterial vasodilation and thrombolysis has been applied successfully in previous case reports although amputation cannot always be avoided.
In the case presented the patient was able to keep his limb, despite being subjected to fasciotomy and graft.
A good communication between surgeon and anesthetist is essential to achieve enough vasodilatation to treat acute isquemia without causing hemodynamic instability and to save the limb of the patient, as happened in this case.

## 07AP13-10

### Venous gas embolism (VGE) in a patient with ovarian cancer during laparoscopic surgery

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**Background:** VGE is a rare but potentially catastrophic complication in laparoscopic surgery. Sudden cardiovascular collapse and neurologic deficit can be seen after the embolism. Signs and symptoms include profound hypotension, tachycardia, dysrhythmias, asystole, hypoxemia, cyanosis, and pulmonary edema. The incidence of clinically significant CO2 embolism varies from 0.001% to 0.59%, and mortality can be as high as 28.5%. We present a case of a patient with possible venous gas embolism during laparoscopic surgery.
**Case report:** A 37-year-old female presented for diagnostic laparoscopy, pneumoperitoneum was obtained with 15mmHg CO2, and the patient was placed in reverse trendelenburg. Subsequently, her MAP dropped to mid-50s, O2 saturation to 30%, tidal volume to 127ml, and EtCO2 to 15mmHg; her PIP raised to 56cmH2O. Pneumoperitoneum was released and the patient repositioned. Endotracheal tube placement was confirmed. Use of phenylephrine and ephedrine was necessary for treatment. Anesthesia team performed an intraoperative transesophageal echocardiogram (TEE) once patient was stabilized; no evidence of embolus was seen. The episode lasted about 5 minutes. A CT of the chest was obtained later and it showed no evidence of embolus.
**Discussion:** VGE, although rare, can be lethal. It occurs when gas enters the venous system; usually as series of gas bubbles which are subsequently transported to the right ventricle. Migration of air to the pulmonary circulation increases pulmonary arterial pressure and resistance to right ventricular outflow, leading to diminished pulmonary venous return, left ventricular preload and cardiac output, thus, resulting in systemic cardiovascular collapse. Diagnosis can be done through clinical findings, EtCO2, precordial doppler ultrasonography, exclusion of other embolic etiologies, and ultimately TEE. Management includes prevention of further gas entry, cardiopulmonary resuscitation, volume expansion, oxygen administration, use of vasopressors if needed, repositioning of the patient, aspiration with CVC, and hyperbaric oxygen.
**References:**
Joshi GP. Complications of laparoscopy. Anesthesiology clinics of North America 2001.
Muth CM, Shank ES. Gas embolism. The New England journal of medicine 2000.
**Learning points:** Rapid diagnosis of VGE can be made with multiple modalities, however TEE can very rapidly delineate between other different diagnoses as well as asses CO, ischemia, volume monitoring and also help guide ongoing treatment.

## 07AP13-11

### First experience with the new European guidelines preoperative management of patients with concomitant cardiac pathology in non-cardiac surgery

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In 2014, ESA / ESC issued new guidelines on the management of patients with concomitant cardiac pathology in non-cardiac surgery.
**Goal:** To evaluate the convenience and efficiency of the most important provisions of these recommendations in patients at high cardiac risk in thoracic surgery.
**Materials and methods:** The results of doing the 20 patients who underwent lobectomy. Functional reserves calculated by the power of metabolic equivalents (MET). It is also determined by the initial level of troponin I (TPI). Additional tests included veloergometry (VEM), monitoring of Holter ECG (HM), coronary angiography (CG). Drug therapy was based on the β-AB, ACE inhibitors and statins (ST). We evaluated the frequency of arterial hypotension, during the operational period of the scale Surgical Apgar Score, the frequency and nature of cardiac complications and 30-day mortality from them. In the dynamics of 24, 48 and 72 hours to determine the level and evaluated the quality of TPI and analgesia by VAS.
**Results and discussion:** All patients were classified as high risk cal surgeons (> 5%). Modified Lee index was 3.3±0.4. MET value was equal to 4.8±0.7. Baseline TPI for all patients outside the normal range (0-0.5 ng / ml) was 0.25 ± 0.05 ng/ml. VEM was held 5 and HM 6 patients. The combined use of VEM and HM performed in 3, of which 2 underwent CG with stenting. Therapy AB and β-ST before surgery was performed in 12 patients. In a survey of CG have been assigned to all patients, and β-AB 5 more (25%) and in 9 out of the group before they were received , the dose has been subjected to correction. The number of patients treated with ACE-up operation has been increased from 14 to 20, but in 7 patients required a dose adjustment. Hypotension was detected in 4 patients. In 2 of the 4 cases, there is de-press the ST segment in leads V1-V3, docked at hemodynamic stabilization. All patients received less than 7 on a scale SAS. All patients had achieved the target level of analgesia at rest (≤3 points), and when you cough (≤ 4 points). Concentration TPI 24, 48 and 72 hours respectively was 0.73±0.08 ng/ml, 0.65±0.06 ng/ml and 0.58±0.05 ng/ml. During the month in 2 patients were marked by complications of AMI after 18 days and pulmonary embolism at day 25 with a lethal outcome.
**Conclusion:** The proposed ESA/ESC guidelines seem to useffectiveness, simple and easy for the anesthetist tool to work out the tactics of patients with cardiac pathology in non-cardiac surgery.

## 07AP13-12

### Atrial appendage: unexpected intervenient in urgent valvular replacement

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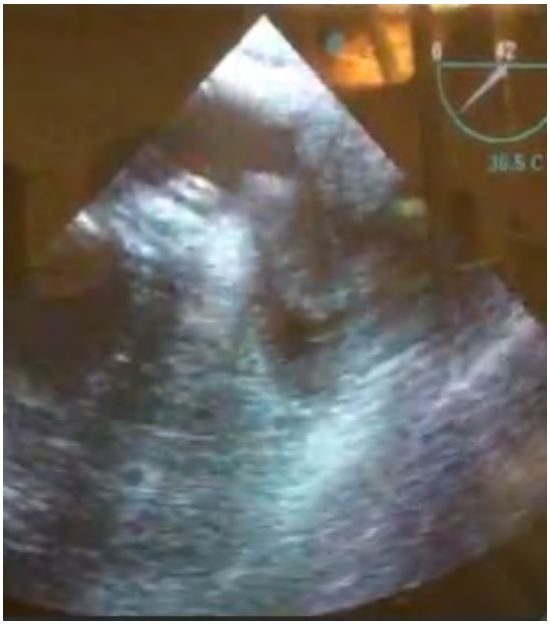
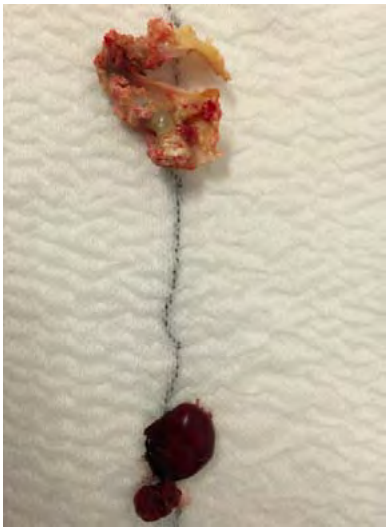
**Background:** Cardiac surgery implies critical balance between thrombosis and hemorrhage. Left auricular appendage (LAA) is frequent source of emboli. Transesophageal echocardiography (TEE) has growing relevance in the perioperative period.
**Case report:** Male, 67 years, to urgent aortic valvular replacement. Critical aortic stenosis (0,6cm2), biventricular failure (ejection fraction (EF) 20%, TAPSE (tricuspid annular plane systolic excursion) 9mm) and pulmonary oedema, under inotropic and vasopressor support; new onset AF under rate control. Pre-CPB TEE excluded intracardiac masses. Uneventful aortic valve replacement (activated coagulation time (ACT)>450 seconds). Post-CPB TEE: large thrombus in LAA.



*[Thrombusecho]*

Removal of intra atrial thrombus and ligation of left atrial appendage.



*[Atrial thrombus1]*

PostoperativeTEE: moderate failure (EF 37%,TAPSE 11mm), normal functioning aortic valve. Uneventful postoperative period.
**Discussion:** Hemostasis results from individual and procedure related elements, balancing hemorrhage and thrombois.Hemodilution, hypothermia, platelet dysfunction and contact with CPB surface interfere with this dynamic process.Intermitente AF may have also played a role towards thrombosis.TEE has a well established role in cardiovascular diagnosis:spacial privileged perspective of cardiac structures,mainly those not seen in transthoracic view(1). Perioperatively, allows real time monitoring of structure and function, aiding individualized strategies and detection of potentially fatal complications(2). As shown in this case, with adequate training and competence, TEE is an invaluable resource.
**References:**
1. Flachskampf F et al. European Journal of Echocardiography, 2010. 11: 557-576;
2. Barber R. Anaesthesia, 2014. 69(7):764-776
**Learning points:** Being irreplaceable in cardiac anesthesia,TEE is an invaluable resource in anesthesia for cardiac patient, highlighting the importance of training and accreditation.

## 07AP13-13

### An evaluation of intubation-associated vocal cord dysfunction after cardiovascular surgery in a single center

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**Background and Goal of Study:** Intubation-associated vocal cord dysfunction (VCD) is a common complication in the perioperative period. Importantly, VCD can lead to serious respiratory complications in critically ill patients. Intubation-associated VCD may be caused by traumatic intubation, however the exact mechanism is unclear. The incidence of VCD has been reported to occur from 2 to 16% in intensive care patients. The aim of our study is to evaluate the incidence of intubation-associated VCD after cardiac surgery in our institution and identify the possible risk factors.
**Materials and methods:** Institutional review board approval was attained for this study. We performed a retrospective record based review of all adult patients who underwent cardiovascular surgery at our center between January 2013 and August 2015. VCD was defined as vocal cord paralysis, subluxation, recurrent nerve paralysis, laryngeal edema, chorditis and severe hoarseness. We investigated the relationship between the incidence of VCD and history of smoking, type of surgical procedure, experience of the intubation provider, duration of surgery, and duration of intubation. A multivariate analysis was performed to identify independent risk factors.
**Results and discussion:** We included a total of 911 patients. After excluding patients who did not meet our criteria 756 were included for final analysis. Twenty-eight patients were diagnosed with VCD (3.7%); vocal cord paralysis (n=13) recurrent nerve paralysis (n=3), laryngeal edema (n=2). Fourteen patients were re-intubated and of which 8 patients required tracheostomy. The risk of VCD was increased with ventricular assist device (VAD) implantation (odds ratio [OR] 3.03; 95% confidence interval [CI] 1.18-7.75, p=0.03) and thoracic aortic aneurysm (TAA) surgery (OR 3.52, 95%CI 1.55-8.04, p<0.01). In the multivariate analysis, brachiocephalic artery repair (p=0.01) was an independent risk factor of VCD. Prolonged surgery over 6 hours (p=0.03) and long mechanical ventilation periods over 72 hours (p=0.04) were also found to increase the risk of VCD. Other factors such as smoking, experience of the intubation provider were not significant.
**Conclusion(s):** We should pay attention to intubation related VCD and perioperative respiratory complications in VAD implantation, TAA surgery, and prolonged surgery and mechanical ventilation periods.
**Reference:**
1. Intensive Care Med 2003; 29: 69-74.

# Perioperative Medicine

## 08AP01-1

### Postoperative delirium in non-cardiac surgery: systematic review of incidence and risk factors

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**Background and Goal of Study:** Postoperative delirium (POD) is a sudden and usually temporary cognitive and emotional disorder, common in older patients submitted to surgery. This is an underdiagnosed, undertreated and still poorly understood condition. This review aims to identify the prevalence and risk factors for POD in order to improve preventive and treatment measures for this condition.
**Materials and methods:** A systematic review of the literature was conducted in the MEDLINE database. Prospective studies published since 2012 and evaluating the incidence of postoperative delirium (determined through the Confusion Assessment Method) and its risk factors were selected. Patients with 65 years of age or higher submitted to non-cardiovascular surgery were enrolled. Search terms included "postoperative delirium" in the title.
**Results and discussion:** Of the 194 results retrieved, 10 were considered eligible (4116 patients). POD rates changed between 8.5% and 47.5% (weighted mean=28.6%). Weighted mean POD incidence was higher in urologic studies (37.1%), compared to orthopedic studies (32.2%) and others (22.1%). Patient-specific factors related to POD incidence included increased age, history of cognitive and emotional/affective impairment and higher functional dependence. Preoperative anemia, intraoperative hemodynamic complications and transfusion were other risk factors commonly reported.
**Conclusion(s):** POD is a prevalent complication in several surgical settings. Adequate preoperative assessment of key surgical variables that may predispose to this condition is paramount for proper prevention and treatment.

## 08AP01-2

### ASA physical status score: one size fits all?

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**Background and Goals:** The American Society of Anesthesiologists physical status score (ASA score) is a six-point scale regularly used to measure preoperative health status. Despite its widespread use, considerable variation in the ASA score classification allocation has been reported due to its lack of inter-rater reliability. Previous studies have reported a broad range of comorbidity profile variation in each class of the ASA score.
Charlson Comorbidity Index (CCI) is an age adjusted score that includes 19 diseases weighted on the basis of their association with mortality. It is the most extensively studied tool both in clinical and research settings.
The primary goal of this study is to evaluate the heterogeneity of each ASA score grade in terms of comorbidity in the preoperative setting. Our secondary goal is to measure association between ASA score and the comorbidity profile assessed by the CCI.
**Materials and methods:** Authors proceeded to a retrospective analysis of the database of patients undergoing a preoperative anesthetic consultation for elective surgery in a tertiary hospital during a 3 year period (January 2012 to December 2014). Statistical analysis was performed with SPSS22.0® ($\alpha$=0.05).
**Results and discussion:** During the study period, 5991 patients were submitted to a preoperative evaluation. Average age was 56 years (56,1 ± 17,3) and 51,5% of patients were male (n=3083). Average ASA score was 2,18 ± 0,59. Average CCI was 3,09 ± 2,64.
Average CCI was significantly different between different ASA scores: ASA 1 (0,54 ± 0,99), ASA 2 (2,69 ± 2.18), ASA 3 (4,9 ± 2,81), ASA 4 (6,9 ± 3,13), ($F(3,5987) = 643,7$, $p<0,05$). A significant positive correlation between ICC and ASA score was found ($r = 0.494$, $n = 5991$, $p<0,05$).
Regarding heterogeneity, grades 2, 3 and 4 presented higher CCI range (17, 18 and 14, respectively) and variance (2,18, 2,81 and 3,13). This data suggests that the higher the ASA score grade, higher the heterogeneity of the comorbidity profile.
**Conclusion:** ASA physical status score has several known limitations. In comparison with the CCI, ASA score shows a positive correlation in each grade of the scale. However it presents important heterogeneity, comorbidity wise, that affects mainly grade 2, 3 and 4 of ASA score. A more comprehensive tool for comorbidity assessment like CCI seems to have a promising role in the preoperative assessment of patients undergoing surgery.

## 08AP01-3

### POPE - pre operative evaluation

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**Background and Goal of Study:** In 2012, our hospital performed 2340 preoperative assessments for ophthalmic surgeries, all conducted by an anesthesiologist. The excessive number of patients and the lack of anesthesia specialists led to the need to create a cost effective screening system. In some countries, nurses assess patients pre-operatively using screening tools and locally-developed protocols. Our objective was to create a pre-operative questionnaire that can be applied by nurses. A final score given by the questionnaire automatically decides the need for further assessment by an anesthesiologist.
**Materials and methods:** On each pre-operative assessment, the questionnaire was applied by a nurse, and the results were registered in a computer database created in MS Access 2010.
The questionnaire included questions concerning: Demographic data, Cardiovascular, Respiratory, Renal, Digestive and Hematologic systems, Physical performance, Personal habits and Past Medical History, and a final score is obtained.
All the patients were also evaluated by an anesthesiologist. The results from these evaluations were compared with the score obtained, and a relation between both was established, determining the cut-off score that decides the need for formal consultation by an anesthesiologist.
**Results and discussion:** We had a total of 82 patients, 9 of them were excluded due to missing data.
From the 73 studied patients, 45 females, 28 males, with an average age of 74,45.
The obtained score was a minimum of -2 and maximum of 37. The score cut-off value that determined the need for anesthesiologist's evaluation was 7, which was found to be the best trade-off between the number of patients incorrectly excluded from the evaluation (12,3%) and the total number of patients submitted to evaluation (46,5%).
**Conclusion(s):** This new simple method of pre-operative assessment can be routinely applied by nurses making sure every patient is assessed in a timely manner.
The obtained score and cut-off value allowed to exclude about half of the patients from further evaluation. However, 12,3% of the patients should have undergone further assessment and were excluded from it, which is quite a high value of false negatives. The score needs to be improved, and more patients are needed in order to refine it.
With this score we aim to create an automated and cost effective screening system to evaluate and stratify the population perioperative risk.

## 08AP01-5

### Patient satisfaction of the Anesthesia Preoperative Evaluation Clinic (APEC) in a tertiary hospital in Taiwan: a questionnaire survey and exploration

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**Goal of Study:** To analyze the patient satisfaction questionnaires of Anesthesia Preoperative Evaluation Clinic (APEC) and make medical quality improvement programs.
**Materials and methods:** The questionnaire was designed with five dimensions including twenty questions about satisfaction which scored by a 7-point Likert scale (1 for extremely poor, 7 for excellent) and four multiple-choice

questions about actual/acceptable waiting time and actual/expected visiting time. The five dimensions were environment(E), waiting time(W), patient safety(P), anesthetic plan explanation(A), and service attitude(S). The study was proved by IRB of Chi Mei Medical Center, Tainan, Taiwan (CMH10404-013). The item-level content validity index was 0.85 confirmed by five experts in APEC. The Cronbach's alpha value was 0.95 in the pre-test 50 questionnaires. During May 25 to August 4, 2015, 1000 questionnaires were completed by patients above twenty years old after they visited APEC. The primary outcome was global satisfaction of APEC. The secondary outcome was the satisfaction of each dimension and the gap between actual and acceptable waiting time/expected visiting time.
**Results and discussion:** The global satisfaction score of APEC was 6.32. The highest score was 6.36 of the question as service attitude of our APEC staff. The average satisfaction scores in the five dimensions of (E), (W), (P), (A), (S) were 6.12, 6.06, 6.29, 6.27, and 6.34.
The lowest scored question was in the dimension (W) as "the acceptability of the interruption of your visiting due to medical emergency" with 5.72 point. The second lowest score was 5.99 of the question as "the decreased degree of anxiety with anesthesia by posters/handout forms" in the dimension of (E). 86.5% of patients waited for less than 10 minutes, while 85.2% of patients were acceptable with waiting more than 10 minutes.
The actual visiting time was less than 10 minutes in 91.5% of patients, while 93.7% of patients expected it less than 10 minutes.
**Conclusion(s):** The global satisfaction score of APEC gave affirmation to our medical service. The result also gave the management component a hint of human resources allocation. It's a better way that the physician was in sole duty in APEC. And there's still much need for improvement in patient instructions with posters/handout forms. The waiting and visiting time were in line with expectation in most patients. The satisfaction questionnaire survey gave a guide for improvement programs of APEC.

## 08AP01-6

### Acute kidney injury and postoperative infection are important predictors of 30-day mortality among patients undergoing elective cardiac surgery

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**Objective:** Cardiac surgery is associated with major morbidity and mortality including acute kidney injury (AKI) and postoperative infection. The incidence of AKI after cardiac surgery ranges from 16.3-38.9% (1) and surgical site infection is in the range of 0.5-6.8% (2).
We have previously reported the incidence of AKI and surgical site infection as 27.0% and 2.4% respectively (3,4). We investigated the impact of AKI and SSI on 30-day mortality in elective cardiac surgical patients in an Asian population.
**Methods:** From August 2008 to July 2012, 2821 patient underwent elective cardiac surgery in Singapore's two major heart centers were recruited. The preoperative, intraoperative and postoperative parameters were analyzed with 30-day mortality as an outcome variable.
AKI was defined using the Acute Kidney Injury Network (AKIN) criteria: increases in serum creatinine ≥26.4 μmol/L or ≥150% from baseline within 48-hour of surgery. Postoperative infection included the infection of chest, leg wound (donor graft), sternal wound, lines, urinary tract etc.
**Results:** The 30-day mortality is 0.50%. Patients who died were more likely to have a higher EuroSCORE, AKI and postoperative infection. The incidence of AKI and postoperative infection was 29.7% and 0.82% respectively. Log-binomial regression showed that EuroSCORE (RR 1.05, 95% CI 1.03-1.08, p<0.001), AKI (RR 3.17, 95% CI 1.04-9.68, p = 0.042) and postoperative infection (RR 14.04, 95% CI 3.33-59.27, p<0.001) were significant predictors of 30-day mortality.
**Conclusions:** This study demonstrated that postoperative AKI and postoperative infection were significant predictors for 30-day mortality after cardiac surgery. Therefore the modification of risk factors for AKI and postoperative infection is important in the reduction of 30-day mortality after cardiac surgery.
**References:**
1. J Cardiothorac Vasc Anesth. 2015 Jul 15. doi: 10.1053/j.jvca.2015.07.013
2. World J Crit Care Med 2015. 4(4); 265-273
3. J Thorac Cardiovasc Surg 2014, 147: 1356-61
4. J Thorac Cardiovasc Surg 2015, 149: 323-8

## 08AP01-7

### Cardiopulmonary exercise testing as a predictor of perioperative morbidity and length of stay following major surgery

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**Background and Goal of Study:** Cardiopulmonary exercise testing (CPET) is a reliable and objective test for evaluation of functional capacity. It is widely used as part of pre-operative assessment prior to major surgery.
We looked at the effect of CPET performance data on length of hospital stay and incidence of post operative complications in patients undergoing major surgery in our hospital.
**Materials and methods:** Retrospective analysis was performed of all patients who underwent CPET testing, and thereafter proceeded to surgery, following the introduction of the service in November 2014.
Previous studies have reported that AT <11ml/kg/min and VE/VCO2 > 34ml/kg/min are predictors of worse post-operative outcome.[1] We therefore subdivided our patients into groups with CPET parameters better or worse than these cut off points, and looked at the influence on length of stay and incidence of complications.
**Results and discussion:** 70 patients underwent CPET testing, 32 of whom proceeded to surgery. 22 underwent vascular surgery (14 EVAR, 8 open AAA repair). 10 underwent major urological or colorectal procedures.
Mean length of stay (LOS) in patients with AT>11 was 6.8 days compared to 9.6 days in those with AT <11 ( Student t test p=0.084). In patients with VE/VCO2<34, mean LOS was 8.8 days, compared to 7.5 days in those with VE/VCO2>34 (p=0.485).
In patients undergoing EVAR, mean LOS was 3.1 days in patients with AT>11, vs 6.6 days if AT<11 (p=0.019). Those with VE/VCO2>34 had a mean LOS was 5.3 days vs 3.2 days if VE/VCO2 <34 (p=0.115).
For more invasive surgery (open AAA repair/ major colorectal and urology), mean LOS in patients with AT>11 was 9.2 days vs 12.5 days in patients with AT<11 (p=0.122). In this group, patients with VE/VCO2 >34 has a mean LOS of 9.2 days vs 11.4 days if VE/VCO2 <34 (p=0.21).
Post-operative complication rates were higher in patients with AT<11 (6/9, 66.7%) than those with AT> 11 (11/23, 43.5%), and in patients with VE/VCO2 >34 (12/21, 57.1%) than those with VE/VCO2 <34 (4/11, 36.3%). (Fisher exact test p=0.003).
**Conclusions:** Reduced AT was associated with an increase in length of hospital stay, significantly so in patients undergoing EVAR . Reduced AT and impaired VE/VCO2 were associated with a significantly increased risk of post operative complications.
**Reference:**
1. Wilson R *et al.* Impaired functional capacity is associated with all cause mortality after major elective intra-abdominal surgery. *Br. J. Anaesth. (2010) 105 (3):297-303*

## 08AP01-8

### Retrospective audit of the effect of anemia on length of stay [LOS], transfusion and acute kidney injury [AKI] following elective total knee replacement [TKR]

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**Background and Goal of Study:** 20% (1) of patients are Anemic before elective limb Arthroplasty. Pre-operative Anemia is associated with increased morbidity, mortality, Length of stay, functional recovery, exposure to blood transfusion and quality of life.
Our goal was to identify the incidence of Anemia in elective TKR patients and their effect on LOS, blood transfusion and AKI at Scarborough Hospital.
**Materials and methods:** 129 consecutive patients having elective TKR at Scarborough Hospital were included in the study. All the results were analyzed using Word Excel.

**Results and discussion:**

| Parameter | Variable | Number and percentage | Length of stay in hours |
|---|---|---|---|
| Age | <70 years | 61 ; 47 percent | 62 |
| | > 70 years | 69 ; 53 percent | 95 |
| Hemoglobin | <12 g/dl | 10 ; 7.75 percent | 93 |
| | > 12 g/dl | 119 ; 92.25 percent | 72 |
| Blood Transfusion | Yes | 5 ; 3.8 percent | 125 |
| | No | 124 ; 96.2 percent | 73 |
| Acute Kidney injury with transfusion | Yes | 2/5 ; 40 percent | 125 |
| Acute Kidney injury without transfusion | Yes | 15/124 ; 12 percent | 93 |

*[Results]*

**Conclusion(s):** Preoperative Anemia, elderly, blood transfusion and AKI prolong the LOS following elective TKR.

**Reference:**

1. L.T Goodnough et al. Detection, evaluation and management of preoperative Anemia in the elective orthopaedic surgical patient: NATA Guideline. BJA 2011 Jan; 106(1): 13-22.

## 08AP01-9

### Service evaluation to assess the impact of CPET on patient post-operative care

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**Background:** Major colorectal surgery is associated with significant morbidity and mortality, a recent UK audit showed mortality of 2.3% and 11.4% for elective and emergency surgery (1).
Predicting patient risk would allow optimization and efficient resource allocation, multiple approaches are used but are flawed, inter-observer variability with ASA, complexity of APACHE, overestimation of mortality in low risk groups with POSSUM (2).
There is a growing body of evidence that CPET is a predictive, repeatable, objective assessment of a patient's ability to cope with the metabolic demands of surgery and thus a way to evaluate fitness and risk to the patient.
**Goal:** To use HDU admission data to determine if the use of CPET to risk stratify patients has had a positive effect on patient post-operative care.
**Method:** Data on HDU admissions was collected locally, this earlier data was compared with the patient data collected by the CPET physiology team.
All CPET patients had their test carried out on a standard protocol. Specific anabolic thresholds (ml/kg/min) were used to risk stratify patients into low (AT > 11), intermediate (AT10.9 - 9.1) and high risk (AT <9). Those at both intermediate and high risk were booked as planned admissions to HDU postoperatively.
**Results:** Demographically both groups were broadly similar. The CPET cohort had a greater number of admissions (26). Lower mean length of stay, 5.6 and 5.7 falling to 4.1 and 4 for emergency and elective admissions. ITU step downs reduced from 5 to 1 after CPET.
**Conclusions:** CPET has reduced length of stay on HDU, significantly admissions have switched from predominantly emergency to elective admissions (40% before, 72% post CPET). Further indirect evidence comes from the reduced ITU step down patients.
It is likely that the effect on length of stay and reduced ITU admissions is due to better and earlier identification of those patients who are likely to deteriorate and the prevention of this by targeted interventions and earlier recognition.

**References:**

1. West et al (2013). Cardiopulmonary exercise variables are associated with postoperative morbidity after major colonic surgery: a prospective blinded observational study. BJA, 112(4):665 - 671.
2. Shah and Hamilton (2013) Clinical review: Can we predict which patients are at risk of complications following surgery ?. Critical care 17:226.
3. RCOS (2011). The higher risk general surgical patient - towards improving care for a forgotten group. Downloaded 11/10/2015.

## 08AP01-10

### Comparative analysis of complications in postsurgical patients by selected discharge unit

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**Background and Goal of Study:** The increasing demand for post-surgical intensive care and the limited availability of intensive care units (ICU) forces to develop pathways for a properly selection of patients.
The aim of this study is to assess the complications of patients that meeting criteria for surgical risk and comorbidity to enter the ICU, were discharged directly from post-anesthesia care unit (PACU) to ward.
**Materials and methods:** Observational, descriptive, cross-sectional study in a secondary referral hospital from September to November 2015, where a preoperative selection requirement ICU based on the factors was performed: Surgery complexity, comorbidities (ASA score III-IV or ASA II older than 75 years). Once surgery was completed, patients were transferred to ICU or PACU by consensus of the multidisciplinary team generating two groups of patients:
-PACU group: discharged patients from PACU to ward.
-ICU group: patients admitted to the postsurgical ICU.
We assessed the following variables: age, ASA score, intervention and incidents during the perioperative period. It has followed up patients for the first 7 days postsurgery, recording complications and readmissions in critical care units. T-student and Chi square was used to compare groups, with significancy level $P < 0.05$.
**Results and discussion:** Of the 4,236 patients who underwent surgery during the study period, 805 patients (19%) had preoperative application for admission to the ICU. Finally, 658 patients (15%) were included in ICU group and 126 patients (4%) in PACU group.
UCI group, 13/658 patients (1.9%) were readmitted in ICU during the first 7 days: 9 surgical complications (bleeding, wound dehiscence) and 4 medical complications (myocardial infarction, sepsis, pulmonary embolism and obstruction of tracheostomy).
**Conclusion(s):** After making a comparative analysis between both groups using T-Student and Chi squared, in this preliminary study no significant differences in early postoperative complications (<7 days) were observed.

## 08AP01-11

### New disability and quality of recovery after elective surgery

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**Background and Goal of Study:** Disability-free survival after surgery has recently been suggested as a postoperative outcome measure. We aimed to evaluate if early postoperative recovery influences development of New Disability after surgery.
**Materials and methods:** An observational prospective study, approved by the institutional ethics committee, was performed in 209 patients scheduled for elective surgery. Included patients were over 18 years, undergoing non-cardiac, non-obstetric and non-neurological surgery, that underwent general anaesthesia and were admitted to the Post Anaesthetic Care Unit (PACU). Exclusion criteria: inability to give informed consent.
Patients were evaluated for perioperative characteristics and Portuguese version of World Health Organization Disability Assessment Scheduled (WHODAS) 2.0 was used at baseline and 3 months after surgery. Patients with New Disability (PND) were considered when WHODAS score increased more or equal than 8% from baseline. Postoperative Quality Recovery Scale (PQRS) and Quality of Recovery 15 (QoR-15) were used to evaluate the quality of recovery after surgery. PQRS was used at baseline and after surgery at minute 15(T15), 40(T40) and days 1(D1) and 3(D3).
Recovery was defined as return to baseline values or better for all questions within each domain;15-item quality of recovery (Qor-15) was applied at baseline and 24 hours after surgery. The EQ-5D VAS was applied 3 months after surgery in order to investigate Spearman correlation with WHODAS. Clinical Frailty scale was applied at baseline and patients were considered to be frail if they were classified vulnerable or in a higher class. Mann-Whitney test, Chi-square or Fisher's exact test were used for comparisons.
**Results and discussion:** Of 209, 166 patients completed WHODAS 3 months after surgery and 8,4% were found to have PND. Overall recovery acessed by the PQRS and QoR-15 scores were not different between groups in all do-

mains and time evaluations. Spearman's correlation between WHODAS and EQ-5D VAS at 3 months was -0.206 (p=0,008). Median age, time in PACU, hospital stay or ASA physical status were not different. PND were more frequently considered frail (26% vs. 6%,p=0,004).
**Conclusion(s):** Postoperative disability as a new characteristic at 3 months evaluation may be considered an important outcome. Overall early recovery in the postoperative period was not different in PND. Frailty, but not ASA, could forecast new postoperative disability.

## 08AP01-12

### Evaluation of financial burden following complications after major surgery in France: potential economic benefits after perioperative goal directed therapy

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**Background and Goal of Study:** Complications following high-risk surgery have an important impact on healthcare costs. Perioperative goal directed therapy (PGDT) has been demonstrated to improve postoperative outcomes and reduce length of stay (LOS).
The objective was to evaluate the cost of complications, derived from the French hospital payment system based on diagnosis related groups and severity scores and then calculate the potential cost savings and LoS reductions, based on a recent meta-analyses of PGDT data published by Pearse et al (1).
**Material and methods:** The billing of 2388 patients who underwent scheduled high-risk surgery between January 2012 and December 2014 were retrospectively collected from three French hospitals. A sample of one hundred records were analyzed to confirm the link between postoperative complications and severity scores. Continuous variables were presented as means ± SD compared with the use of Student's t-test or median [IR] compared with Wilcoxon test in case of normality violation.
**Results and discussion:** The analysis confirmed that a severity score of 3 and 4 (on a scale of 1 to 4) was associated with complications in 90% of cases. Data were pooled between hospitals in 2 groups: severity 1+2 vs severity 3+4. The presence of a complication in 36% (n=865) of patients was associated with a significant increase of costs from 8,205 ± €3,335 to 22,081 ± €16,090 (p<0.001, delta of €13,876) and prolonged LoS from a median of 9 to 21 days (p<0.001, delta 11 days). Based on the expected impact on the incidence of complications, it was projected that PGDT could reduce healthcare costs by between €854 and €1458 per patient with a potential reduction in hospital bed days of 2573 to 4423 over three years. Assuming a median LOS of 11 days for additional procedures, between 234 (+9.8%) and 402 (+16.8%) more patients could be treated over those 3 years. Based on global French data (around 47,000 high risk surgeries per year), the financial savings could range from 42 M€ to 65 M€.
**Conclusions:** Implementing PGDT during high-risk surgery could significantly reduce healthcare costs and LOS in France whilst improving patient access to care and reducing waiting times for procedures.
**Reference:** 1. Pearse RM et al. Effect of a Perioperative, Cardiac Output-Guided Hemodynamic Therapy Algorithm on Outcomes Following Major Gastrointestinal Surgery. JAMA 2014;311:2181.

## 08AP02-1

### When medical treatment fails in a patient with idiopathic thrombocitopenic purpura (ITP) - an anesthetic-surgical challenge

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**Background:** ITP is an autoimmune cause of thrombocytopenia.[1]
Splenectomy is performed in the presence of medical treatment's refractory disease.[2] The optimization of hemostasis is critical to minimizing the risk of bleeding.[1]
**Case report:** 47 year-old man with diffuse large B cell Non-Hodgkin's lymphoma, treated with chemoterapy protocol and subjected to bone marrow (BM) autograft in 2010. In 2014 he presented in Onco-hematology's (OH) appointment with severe thrombocytopenia associated with mucocutaneous hemorragic manifestations. A myelogram was performed, excluding BM pathology, and a thoraco-abdomino-pelvic CT scan that revealed no disease relapse. In this context, it was assumed the diagnosis of ITP. By refractory to medical treatment instituted (Prednisolone, Dexamethasone and Rituximab), with platelet count (PC) 16000, laparoscopic splenectomy was submitted under balanced general anesthesia. Pre-operative optimization envolved a multidisciplinary team, having performed intravenous immunoglobulin (IVIG) and adrenal's insufficiency prophylaxis with hidrocortisone. Conducted, in total, 2 platelet's transfusion pools, before induction of anesthesia and in the splenic hilum sealing time. Anesthetic-surgical time <3 hours, uneventful, with hemorragic losses estimated in 200mL. Transferred, extubated and hemodynamically stable, to the post-anesthetic care unit. He was, then, transferred to the intermediate-care unit, and the first 24 hours was discharged to the infirmary. 4 hours after the surgery presented with PC 72000. On the 3rd postoperative day is discharged with PC 115000. The anathomo-pathological study of the spleen confirmed ITP. The patient remains with steroid therapy and surveillance in OH appointment.
**Discussion:** The management of these patients, through careful and temporary administration of drugs, wants to reach a PC >30000, preferably >50000, to face invasive procedures safely and with low drug toxicity. The half-life of transfused platelets is short, being extended by the administration of IVIG. The anesthetic and surgical approach is extremely relevant for the hemorrhagic risk associated. Thus, prior hemostasis optimization is critical.
**References:**
1 Int J Surg Case Rep. 2013;4(10):898-900;
2 Anaesthesia. 2009 Feb;64(2):226-7
**Learning points:** The ITP refractory to medical treatment involves a multidisciplinary approach for the surgical and anesthetic risk. IVIG is an important preoperative agent in a scheduled surgical procedure.

## 08AP02-2

### Monitoring platelet function in emergency surgery of a patient under clopidogrel

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**Background:** Management of clopidogrel before surgery is a challenge, mainly in emergency cases because its powerful antiplatelet action mediated by the specific P2Y12 receptor blockade. Although patients receiving clopidogrel are at a risk for bleeding, it is not the same for all cases. The reason could be that the response to clopidogrel administration varies widely among patients. Clinical, genetic, and cellular factors are involved in the response variability. Monitoring platelet responsiveness could be an optimal way to individualize the management of this clinical.
**Case report:** A 74-year-old man with a past medical history of an acute ischaemic stroke 8 y ago arrived to the emergency department with acute abdominal occlusion and abdominal peritonitis due to a ruptured diverticulitis. The surgeon indicated emergent abdominal laparotomy (in 90'). The patient was treated with clopidogrel 75 mg od, last drug tablet intake in the morning (about 8 hours before). We performed a platelet reactivity test with the VerifyNow device (Accumetrics, San Diego, CA-USA) with the specific cartridge to measure platelet P2Y12 receptor blockade. The result shows P2Y12 Reaction Units (PRU) measurement of 124 (base 186 PRU), resulting in a 0% inhibition due to clopidogrel. The surgery passed without meaningful bleeding, the PO

period didn't show a significant decrease of haemoglobin and the patient left the hospital 10 d after surgery without incidents.
**Discussion:** As clopidogrel increases perioperative bleeding, guidelines recommend withholding clopidogrel in patients scheduled for surgery for 5 days (1). Some guidelines suggest the use of platelet function tests for optimal timing of surgery, although they do not provide an ideal platelet function assay to increase the safety of surgery (2). In emergency surgery, the use of point-of-care tests to assess the platelet function in patients receiving clopidogrel could provide a guide for the specific management of an eventual bleeding, distinguishing if it is related or not with the action of clopidogrel. In our case, the results of the test were of great aid, avoiding any delay in the surgery and any platelets transfusion.
**References:**
1. Kozek-Langenecker S, et al. Eur J Anesthesiol 2013;20:270-382.
2. Kristensen SD, et al. Eur J Anesthesiol 2014;31:517-73.
**Learning points:** Platelet function assessment could aid the management of patients under clopidogrel therapy. The POC devices should be validated for this objective.

## 08AP02-3

### Haematocrit and outcome after admission to surgical intensive care unit

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**Background and Goal of Study:** A low haematocrit after surgery has been associated with poorer outcomes as cardiac-related morbidity and mortality. Anaemia could be especially important in critical ill patients since they have increased metabolic demand. We aimed to evaluate the impact of a low haematocrit in patients' outcomes after non-cardiac surgery in a surgical intensive care unit (SICU).
**Material and methods:** After study approval by the institutional ethics committee, an observational retrospective study was conducted. Patients submitted to non-cardiac elective and emergency surgery admitted at the SICU (from Jan 2006 to July 2013) were included. Exclusion criteria were age <18 years old, length of stay <12h, and patients readmitted in the context of initial admission in the study period. Patients were classified as having low hematocrit (PLH) if hematocrit was below 30 at SICU admission. Severity of disease scoring systems were evaluated and his variables were measured individually. Postoperative complications: acute kidney injury (AKI) and major cardiac events (MCE) were evaluated. Patient's demographics and perioperative data were collected. The Mann-Whitney U test, Fischer's exact or Chi-square test were used.
**Results and discussion:** From a total of 4565 patients, 4398 were included in the study. AKI occurred in 285 patients (6.5%), MCE in 107 patients (2.4%) and 327 patients died (7.4%). 1126 (25.6%) were PLH. These patients had more frequently serum creatinine >2.0 mg/dL ($p<0.001$), they were more often submitted to non-elective surgery ($p<0.001$), were admitted more frequently with a Glasgow Coma Scale ≤ 9 ($p<0.001$), and were more often on mechanical ventilation ($p<0.001$). They had at SICU admission a lower core temperature ($p<0.001$), lower systolic blood pressure ($p<0.001$) and lower mean arterial pressure ($p<0.001$) with a higher heart rate ($p<0.001$). They stayed longer in SICU ($p<0.001$) and had a longer hospital stay ($p<0.001$). Age and gender were similar among all patients. After SICU admission PLH had higher rate of MCE (4% vs 1.9%, $p<0.001$) and AKI
(11.5% vs 4.7%, $p<0.001$). They had a higher mortality rate at SICU (3% vs 0.8%, $p<0.001$) and during the hospital stay (12% vs 5.9%, $p<0.001$).
**Conclusion(s):** PLH had frequently alterations in acute physiological measurements and had more frequently adverse outcomes. These patients had higher SICU and hospital length of stay and had a higher ICU and hospital mortality rate.

## 08AP02-4

### Massive pulmonary thromboembolism after subarachnoid blockade

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**Background:** Pulmonary thromboembolism during or after regional anesthesia, although very rare, it has been reported in cases undergoing lower limb orthopedic surgeries. This condition is a cardiovascular emergency that may lead to severe acute failure of the right ventricle with increased risk of death[1]. Is here reported a case of a massive pulmonary thromboembolism after a subarachnoid blockade, to highlight the need of a quick acting, in order to decrease its major complications.
**Case report:** An 84-yr-old woman, 64kg, with arterial hypertension, to be submitted to open osteosynthesis due to right supracondylar femur fracture. On the basis of the patient's history and clinical exams, a subarachnoid blockade (levobupivacaine, 10mg) was performed for anesthesia.
During mobilization of the leg for disinfection, the patient experienced dyspnea, chest pain, progressive desaturation, tachypnea, marked tachycardia and arterial hypotension, followed by respiratory arrest and severe bradycardia. At that point endotracheal intubation was promptly performed and hemodynamic stabilization assured by aminergic support.
Observation of a low etCO2 and signs of right heart failure on echocardiography, the patient was immediately taken to CT-angio. A massive PTE was confirmed. For that reason an intravenous administration of heparin 4000 I.U. was performed immediately. The patient was admitted to PACU for PTE treatment and extubated 1 day after. Ambulatory treatment for PTE was prescribed and the surgery postponed.
**Discussion:** A systemic review of literature revealed that immobilization, advanced age and long bone fractures are risk factors for developing deep venous thrombosis, with rapid evolution to acute PTE due to venous dilation caused following spinal anesthesia[2].
A high degree of suspicion and rapid detection of signs are needed to immediate intervene, leading to early diagnosis and treatment of an acute PTE that arose after performing spinal anestesia.
**References:**
1. Cantarella G, La Camera G, Lanzafame B.Acta Med Medit 2015,31:335
2. Anderson Jr. F, Spencer F,Circ 2003;107:9-16
**Learning points:** The clinical symptoms of severe hypoxia, dyspnea, chest pain, marked desaturation, tachycardia, and arterial hypotension after spinal anesthesia in patients with traumatic fractures of the femur to undergo orthopedic surgery should immediately raise the suspicion of acute PTE. Careful surveillance of such patients is necessary to prevent critical events.

## 08AP02-5

### Thromboelastometry as a guide in a patient with an acquired dysfibrinogenemia due to an acquired inhibitor that produced a delay of fibrinopeptide B release scheduled for thoracic surgery

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**Background:** Acquired inhibitors that interfere directly with fibrin formation are rare and the vast majority occur in patients with autoimmune disease, malignancy or without underlying causes[1]. In our case, routine coagulation tests have a low predictability of bleeding and tromboelastometry may improve hemostatic monitoring.
**Case report:** A 52-year-old woman, scheduled for mediastinoscopy for lymph node staging of lung cancer. In the preoperative period, she was found to have a prolonged prothrombin time (2.98), activated partial thromboplastin time (3.62) and thrombin time (>300) but a normal reptilase time. She denied easy bruisability, petechiae, purpura or ecchymosis. She had ten abortions in the past. Hemostasis Unit diagnosed an acquired dysfibrinogenemia with an inhibitor that produced a delay of fibrinopeptide B release. We performed a ROTEM® before the surgery and we noticed an INTEM: CT:363 s MCF:84s, EXTEM: CT:220 s MCF: 86s and FIBTEM: 85 mm. We administered fibrinogen (1g) previous to the surgery and it was performed without any complications.
**Discussion:** Most patients with dysfribrinogenaemias due to delayed relase of fibrinopeptide B do not have associated bleeding complications. There are

two potential explanations for the absence of haemorrhagic manifestations. Firstly, only a small amount of fibrinopeptide B release is sufficient to influence the clotting process. Secondly, any liberation of fibrinopeptide B enhances the rate and extent of lateral association and fibrin assembly but is not necessary for clots themselves to form. These two functional characteristics of fibrinopeptide B liberation explain how patients with defects in fibrinopeptide B liberation can have striking "in vitro" laboratory findings without evidence of clinical bleeding[2]. Thromboelastometry helps us during the perioperative period.

**References:**
1. Nawarawong W. The rate of fibrinopeptide B release modulates the rate of clot formation: a study with an acquired inhibitor to fibrinopeptide B release. Br J Haematol 1991; 79:296-301.
2. LLobet D. An acquired inhibitor that produced a delay of fibrinopeptide B release in an asymptomatic patient. Haematologica online 2007;92:(2)

**Learning points:** Routine coagulation screening performed in the perioperative period has a low predictability of bleeding during the surgery. We need other point of care strategies as ROTEM® to define how the coagulation "in vivo" is.

## 08AP02-6

### Wheezes may lead you wrong

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**Background:** A case of tracheal stenosis and dilated cardiomyopathy in a 35-year-old woman misdiagnosed with asthma.
**Case report:** A middle-age woman was transferred to our hospital experiencing dyspnea with no improvement after bronchodilators. She suffered from leukemia treated with chemotherapy and asthma.
Due to important hypoxemia a TC scan was done showing a multinodular goiter that was compressing 75% of the tracheal lumen. A total thyroidectomy was performed.
Tracheal intubation was guided by fibrobronchoscopy, but low cardiac output signs were noticed during the procedure and in our Post-Anesthesia Care Unit.
We started hemodynamic support with norepinephrine and dobutamine infusions and hemodynamic monitoring with PiCCO. Echocardiography showed dilated ventricles and 30% ejection fraction,while chest x ray showed grade 3 cardiomegaly.
Furosemide, spironolactone and levosimendan infusion were initiated, 24 hours later, no hemodynamic support was required.
The patient was discharged to the cardiology department 4 days after surgery.
**Discussion:** Even with cardiomegaly and symptoms due to a decompensated heart failure, the patient was diagnosed with asthma, her age being a confusing factor and goiter worsening her respiratory failure.
We diagnosed it with echocardiography and we used transpulmonary thermodilution for assessment of cardiac function.
We started dobutamine and norepinephrine in order to solve low cardiac output (1). Levosimendan infusion of 0.1mg/kg/min for 24 h improved general and pulmonary hemodynamics.
Dilated Cardiomyopathy is characterized by a dysfunction of one or both ventricles, chemotherapy or hyperthyroidism being the possible etiology in this patient. Newly identified targets, such as calcium sensitizing, improve prognosis and reduce mortality (2).

**References:**
1. M. Merlo et al (2015): Clinical management of dilated cardiomyopathy: current knowledge and future perspectives, *Expert Rev Cardiovasc Ther*, DOI :10.1586/14779072.2016.1125292.
2. P. Pollesello et al (2015): Calcium sensitizers: What have we learned over the last 25 years? *Int J Cardiol*, 203 (2016) 543-548.

**Learning points:** Dilated Cardiomyopathy may present de novo in people without known cardiac dysfunction, we should suspect it when cardiomegaly and dyspnea are present.
Echocardiography is an important tool for urgent diagnosis.
Levosimendan is a potential drug for the treatment of decompensated heart failure.
Fixation errors could lead to a misdiagnosis with fatal consecuences.

## 08AP02-8

### Cardiogenic shock from takotsubo cardiomyopathy cannot be prevented by thoracic epidural anesthesia (TEA)

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**Background:** Takotsubo cardiomyopathy (TM) is a rare condition typically associated with acute emotional or physical stress, especially in postmenopausal women. Clinical findings are chest pain and dyspnea, often mimicking myocardial infarction (MI). Angiography or cardiac ultrasound typically show left-ventricular (LV-) apical akinesis or hypokinesis and basal hypercontractility, which results in apical ballooning and decreased ejection fraction. Catecholamine overload seems to be the likely pathophysiological mechanism.
Thoracic epidural anesthesia (TEA) is supposed to reduce perioperative cardiac stress by reducing cardiac sympathetic activity. Thus it can be hypothesised that TEA might reduce stress vulnerability in patients with TM.
**Case report:** We describe the case of a 80-year-old woman with history of arterial hypertension. Preoperative transthoracic echocardiogram (TTE) showed normal LV-function without wall motion abnormalities. The patient underwent uncomplicated open sigmoid resection for colonic cancer in general anesthesia combined with TEA on level Th8/9. Surgery was without any major complications. Postoperative analgesia was sufficient without any additional opioids. The patient was very concerned about urinary incontinence despite placement of a foley catheter. On day 4 after surgery, the patient had to be readmitted to ICU with acute dyspnea and tachycardia. She was pale and sweating. Lab tests showed a lactate of 13.5 mmol/l and a troponin I of 3100 U/ml. ECG showed new RBBB. TTE showed reduced LV function with severe apical hypokinesia. MI was ruled out during urgent cardiac catheterization. Ventriculography showed apical hypokinesis, apical ballooning and an ejection fraction of 17%. The patient recovered well afterwards. Follow-up TTE showed complete recovery of LV function.
**Discussion:** Our patient suffered from TM despite effective TEA. The reason for this might have been her high level of anxiety over several days resulting in high levels of circulating catecholamines, which were not influenced by TEA.
**Learning points:** Although cardiogenic shock from TM cannot be completely prevented by TEA we advocate the use of this technique in patients with a history of TM. Since manifestation of TM is strongly associated with emotional stress, we assume that general stress levels can be reduced by the excellent analgesia provided by TEA. In addition, such patients should be closely monitored for emotional stress and treated accordingly.

## 08AP02-9

### Intraluminal thrombus during placement of a central venous catheter: is the ultrasound a thing of the present or from the future?

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**Background:** The causes of internal jugular vein (IJV) thrombosis include: malignancy, thrombophilic abnormalities, central venous catheter (CVC), etc[1]. The complications vary from sepsis, pulmonary embolism and airway edema1. Two-dimensional imaging ultrasound guidance (US-G) is recommended, by the main societies, as the preferred method for insertion of a CVC into the IJV in elective situations, for its higher first insertion attempt success rate, fewer number of attempts and reduced mechanical complications[2,3]. This case reports a clinical situation in which the US-G was of high clinical relevance compared with landmark guided technique (LGT).
**Case report:** Female, 30 years old, ASA 3, presenting with controlled asthma, end-stage renal disease on hemodialysis, atrophic right kidney, mechanical aortic, mitral and tricuspid valve, under anticoagulant therapy, pacemaker and controlled hyperprolactinemia. She was proposed for retroperitoneal laparoscopic nephrectomy due to right kidney cancer. Preoperative evaluation had no significant findings. Before induction of anesthesia it was attempted placement of CVC in the right IJV by LGT, with multiple unsuccessful attempts. It was tried again on the left using an US-G technique, which showed an intraluminal thrombus in the left IJV. It was then decided not to put CVC and keep only two broad gauge peripheral accesses. It was performed a balanced gen-

eral anesthesia. The patient remained hemodynamically stable throughout the procedure, which lasts about 2 hours. It was extubated and taken to the post-anesthesia care unit where she recovers for 24h, uneventful.
**Discussion:** The management of complications related to CVC placement is essential to a safe anesthetic practice. The US-G CVC insertion allow the identification of the precise position of the target vein, the surrounding anatomic structures and the detection of anatomical variants or thrombosis within the vessel[2]. This case highlights the great importance of US-G in the CVC insertion to improve patient outcome based on the available literature.
**References:**
1. Q J Med 201;104:209-219.
2. J Am Soc Echocard. 2011;24:1291-318.
3. Anesthesiology 2012 Mar;116:539.
**Learning points:** Despite the obvious advantages of US-G technique, many hospitals do not have easy access to such technology. Since it's an operator-dependent method, experience has an influence on the results, therefore there's a need for investment on operator's training to acquire the necessary manual skills[2].

## 08AP02-10

### Successful perioperative management of a child with von Gierke disease

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**Background:** Von Gierke (Glycogen storage disease type 1a) is an autosomal recessive disorder caused by a deficiency of the enzyme glucose 6-phosphatase. Anesthetic challenges include the management of lactic acidemia, hyperuricemia, hyperlipidemia and the avoidance of potentially catastrophic fasting hypoglycemia.
**Case report:** A 15 year-old, 54.5 kg young male with a history of GSD 1a presented for the retroperitoneoscopic resection of an adrenal mass. Preoperative preparation included a consultation with an endocrinologist, whose recommendations are outlined in table 1.
**Discussion:** The day before surgery, the patient was admitted by the endocrine service and managed according to the recommendations shown in table 1. On the day of surgery, anesthetic management consisted of; 2 mg of IV midazolam premedication; induction of anesthesia with fentanyl, propofol, and rocuronium; and general anesthesia with continuous infusions of propofol and dexmedetomidine. A maintenance infusion of D10 with 0.9% NS at 78 ml/hr was continued intraoperatively, and plasmalyte was used for supplemental fluid boluses. The first arterial blood gas sample (obtained 1 hour after induction) revealed a lactate level of 10.5 mmol/l and a glucose level of 119 mg/dl. Although subsequent glucose levels were within normal range, lactate levels remained above 10 mmol/l elevated despite two 500 ml fluid boluses. The surgical procedure was completed uneventfully and the patient was extubated and taken to the recovery room in stable condition. Blood glucose and lactate levels were checked at hourly intervals in the immediate postoperative period. Elevated lactate levels were treated with a 1 liter bolus of NS and returned to preoperative levels within 12 hours of surgery. The patient was discharged home in stable condition on postoperative day 1. Frequent monitoring of glucose levels and providing a glucose infusion during the fasting period aided in the prevention of hypoglycemia. In addition to tight glucose control, boluses of 0.9% NS resulted in the gradual reduction of lactic acidemia.
**Reference:**
1. Anaesthesia in Von Gierke's disease: Current approach to management: Anaesthesia, 1980, v 35, pg 699-702
**Learning points:** Frequent monitoring of glucose levels and a glucose infusion during the fasting period aids in the prevention of hypoglycemia. Boluses of 0.9% NS results in the gradual reduction of lactic academia that can develop.

## 08AP02-11

### Perioperative ventricular arrhythmias in a patient treated with Christmas rose (Hellerobus spp) powder - case presentation

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**Background:** Perioperative ventricular arrhythmias are life-threatening cardiac complications, which can be caused by a variety of causes. "Christmas rose" or Hellerobus is a natural product used in various ailments, including constipation. High doses of Hellerobus can cause cardiac toxicity induced by aglycons and protoanemonin.
**Case report:** We present the case of a 28 year-old female patient due to perform a colonoscopy under total intravenous anesthesia (TIVA). From her medical history, we mention that the patient suffered from chronic constipation, treated with a variety of laxatives. A month prior to the colonoscopy she began self-administration of Hellerobus powder (0.5 g/day) and two days before hospital admission she increased the dosed to 2g/day. Clinical and laboratory preoperative evaluation revealed no other pathological findings. During TIVA Midazolam (4mg), Fentanyl (0.1 mg) and Propofol (50 mg) were administered. No saturation variations were registered. Five minutes after initiating the procedure ventricular bigeminy was observed, shortly followed by an episode of sustained polymorphic ventricular tachycardia (>30seconds). After spontaneous remission of ventricular tachycardia, ventricular bigemeny persisted, that imposed lidocain 1% (60 mg) administration. Colonoscopy ending and anesthetics antagonizing were decided. Ventricular arrhythmia continued requiring intravenous metoprolol (2mg) and lidocain 1% (40mg). Twenty minutes later the ventricular bigeminy ceased.Subsequent cardiologic investigation (echocardiography, holter ecg monitoring, cardiac stress test) revealed no pathological findings, so that Hellerobus cardiac toxicity was incriminated. Stopping Hellerobus powder administration was recommended. The cardiac reevaluation maintained normal at one month, so that colonoscopy under TIVA was one again performed with no incident.
**Discussion:** This case draws attention to the fact that natural products that are apparently harmless can cause life-threating systemic toxicity that can interact with anesthetic agents. Preanesthetic evaluation has to take into account natural treatments especially if they are not prescribed by a physician.
**Learning points:** The importance of preanesthetic evaluation, Awareness of natural product's toxicity.

## 08AP03-1

### Perioperative morbidity and mortality in bariatric surgery - the experience of a center

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**Introduction:** Obesity is a chronic disease and its prevalence is rising all over the world. Bariatric surgery is the best long-term treatment for morbid obesity. Although considered to be safe, there are still risks of considerable morbidity and potential mortality by 10% and 1.5 %, respectively.
The aim of this study is to describe the experience of a center in the surgical treatment of obesity and describe the morbidity and mortality occurred until hospital discharge.
**Methods:** Monocentric retrospective study that included the patients submitted to bariatric surgery from January 2010 to November 2015. A database for all patients was created based on: type of surgery, sex, age, ASA classification, BMI, duration of surgery, duration of hospital stay and occurrence of complications.
**Results:** 679 patients (120♂ and 559♀ ) submitted to bariatric surgery (1 duodenal switch, 41 gastric banding, 319 gastric sleeve, 318 gastric bypass), age 44,13±9,92y (min 19y - max68y), BMI 44±8kg/m$^2$ (min 27kg/m$^2$ - max 82kg/m$^2$), ASA classification II - 523 patients, ASA III - 155, ASA IV - 1, duration of the procedure 146±96min (min 55min - max 535min). Duration of hospital stay 7,88±10,92 days (min 2 days, max 144 days). Hypertension (n=368), hyperlipidemia (n=220), diabetes (n=199), depression (n=143) and obstructive sleep apnea (n=98) were the most common diseases in this population.
Complications occurred in 47 patients (6,92%): enteric fistula (n=14), acute renal failure (n=13), acute hemorrhage requiring blood transfusion (n=13), surgical wound infection (n=11), sepsis (n=8), urinary tract infection (n=6),

pneumonia (n=5), intra-abdominal abscess (n=5), hemorrhagic shock (n=1), septic shock and pulmonary embolism (n=1). 10 patients required urgent admission in the Intensive Care Unit.
2 (0,29%) patients died in the postoperative period, following hemorrhagic and septic shock.
**Discussion/Conclusion:** The incidence of morbidity and mortality was 6.92 % and 0.29%, respectively, both lower when compared to other reference centers. The reduced incidence of these adverse events reflects a joint effort of all team members of the Unit of Surgical Treatment of Morbid Obesity of our center. A careful preoperative evaluation associated with a risk stratification and adequate planning of the postoperative period are essential to reduce the incidence of complications in patients undergoing bariatric surgery.

## 08AP03-2

### Retrospective analysis of incidence of postoperative complications in bariatric surgery in the General Hospital of Valencia

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**Background:** Obesity is a global health problem. Up to 35% of the population in the US and 15-20% in Europe are considered obese. Obesity is associated with significant comorbidities. In recent years there has been an increase in the number of bariatric surgeries. Approximately 344,000 bariatric surgeries are performed annually worldwide. Pre-anesthetic assessment should be focused on detection of co-morbidities and high-risk patients to optimize outcome.
**Goal of study:**To determine the incidence of mortality in our study population and the most frequent complications that have occurred in patients undergoing bariatric surgery from November 2010 to November 2015 in the General Hospital of Valencia.
**Materials and methods:** A retrospective observational analysis of bariatric surgeries performed in our hospital between November 2010 and November 2015.
**Results and discussion:** Between November 2010 and November 2015, 141 bariatric surgery procedures were performed in our hospital. The specific interventions include 123 sleeve gastric, 15 gastric bypass, and only 3 intragastric prosthesis. The main comorbidities found were, obesity sleep apnea (75 patients), hypertension (76 patients), metabolic syndrome (66 patients), dyslipidemia (60 patients), type 2 diabetes mellitus (60 patients), joint disorder (47 patients) and heart disease (6 patients). The 30-day mortality rate was 0%. 8 patients presented surgical wound abscess, 7 patients had respiratory infection without requiring critical care unit admission, in 7 patients suture dehiscence occurred and 8 patients had a intraabdominal hematoma, 1 patient suffered a perioperative myocardial infarction and reintervention were performed in 10 patients.
**Conclusion(s):** The absence of deaths associated with bariatric surgery and the low incidence of complications associated with it, make bariatric surgery a safe technique for the patient, which provides great benefits on health. Anesthetic management involves challenging and extensive knowledge of the physiology and pharmacology variations in the obese patients.

## 08AP03-3

### Relationship between positive fluid balance and complications development after major abdominal operations

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**Background and Goal of Study:** To determine relationship between excessive fluid administration during the perioperative period and complication development after major abdominal operations.
**Materials and methods:** A retrospective study of the perioperative period after major abdominal operations in 300 patients was performed. The physical condition of patients corresponded to 3 class of ASA. The median age was 46.0 (38,0-62,0) years. The duration of the operations was more than 180 minutes. All patients received standart fluid management were divided into 2 groups according to complication development during postoperative period: 1 - with complicated postoperative period (n = 69), without complications (n = 231).
**Results and discussion:** Patients with complications had significantly greater cumulative positive fluid balance, than patients without complications on postoperative day 1 (34,5 (19,5-44,3) and 21,9 (7,1-31,3) ml/kg; p > 0.05), day 3 (80,4 (61,1-106,2) and 38,2 (21,2-58,7) ml/kg; p <0.03), day 5 (115,2 (79,2-118,5) and 40,6 (17,7-58,6)ml/kg; p <0.01), day 7 (134,4 (107,9-166,8) and 42,2 (24,3-61,9)ml/kg; p <0.01), day 9 (135,3 (118,8-158,4) and 47,5 (29,4-68,6)ml/kg; p <0.01). Multivariable regression analysis demonstrated that cumulative fluid balance in day 3 (risk ratio =2.12, 95% CI =1.36-3.51, *P*-value =0.001) was independent risk factor for postoperative complications.
**Conclusion(s):** It is necessary to count the cumulative balance, along with the daily balance as accumulated fluid can be significant. Positive fluid balance in postoperative day 3 was a significant risk factor for complications in patients after major abdominal operations.
**Reference:**
*Zabolotskikh I.B., Musaeva T.S., Kulinich O.V.* Individual approach to perioperative fluid therapy based on the direct current potential levels in patients after major abdominal surgery. European Journal of Anaesthesiology. 2015. Т. 32. № S 53. С. 260.

## 08AP03-4

### Outcome prediction in Hip fractures in the elderly: a survey of two scoring systems

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**Background and Goals:** Hip fractures are a serious problem in our growing elderly population. 10% of those having this will die within a month, with 30% mortality at 1 year. Any attempt at Outcome Prediction in this group of patients could inform decision making about the level of care needed, the consent process (including resuscitation status), communication with patients and relatives. It would also allow planning for appropriate anaesthetic and perioperative management.
**Materials and methods:** In our institution, the Nottingham Hip Fracture Score (NHFS) is commonly used for Risk Prediction. We have trialled the use of the P-POSSUM score (PPS) in the surgical population at large. We hypothesised that given the physiological derangements common in elderly patient with HF, the PPS may help us in outcome prediction.
We aimed to look at these two scores in a group of HF patients to compare their relative benefits, risk prediction and clinical validity.
We retrospectively identified operations for HF for a month long period in 2013, looking at 18 sets of notes. Both NHFS and PPS were calculated for each patient and the scores compared.
**Results and discussion:**
There was a wide variation between the two scores.
31% of the times both scores had similar prediction.
In over half the cases, the scores disagreed by 4-11% risk. In 6% the risks prediction were out by 40%.
No one score consistently over predicts risks. The NHFS has only 7 parameters, while the PPS looks at 18. However some of the PPS parameters are not specific to orthopaedics.
In those who died within 30 days of surgery, NHFS seemed to underestimate the risks posed by the multiple comorbidities existing when compared to the PPS.

**Conclusions:** Neither the NHFS nor the PPS can accurately predict outcomes in HF surgery. A better score should incorporate important factors such as age, sex, specific comorbidities (cardiac, respiratory, ECG), GCS/AMTS, whether patient lives in an institution. It would also measure areas more specific to orthopaedics such as previous function and support. Orthogeriatric assessment pre-op within 72 hours and the time period from admission to surgery (<36hr/>36hr) would be very important variables in the ideal score.

## 08AP03-5

### Do we know the risk?

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**Background:** Recent reports have recommended that risk assessment is carried out and documented in the preoperative setting.[1] The Supreme Court this year has mandated that patients have individualised risk assessment before any intervention.[2] Additionally, a recent study has shown a link between postoperative morbidity and reduced mortality.[3]
**Aims:** The aim of our audit was to elicit whether patients undergoing major colorectal or urological surgery were being risk assessed preoperatively. As a secondary aim, after retrospectively risk scoring patients, we wanted to determine if there was a correlation between high risk patients (defined as patients with a mortality risk of greater than 5%) and length of stay or post operative complications.
**Method:** The pre-operative e-form assessments, anaesthetic charts and surgical clinic letters of 50 consecutive patients, undergoing major colorectal or urological surgery for resection of a malignancy, were assessed for any documentation of risk scoring. The 50 patients were then followed up to elicit length of hospital stay, any post-operative complications and any additional discharge planning. These patients were then retrospectively risk assessed using the Surgical Outcome Risk Tool[4] and the information analysed to see if there were any obvious trends or correlations.
**Results:** 2 out of the 50 patients (4%) had a documented pre-operative risk score.
We found a positive correlation between a higher mortality risk (as determined by a retrospective SORT score) and the incidence of postoperative complications. All patients with a predicted 30 day mortality risk >3% developed a significant complication (e.g. AKI, MI, CVA); and 94% of patients with a predicted mortality score >2% also followed a similar pattern.
**Discussion:** Risk assessment is now a nationally recommended and legally mandated part of preoperative preparation. Further investigation is required to determine what barriers may exist within our insititution to prevent preoperative risk assessment of patients undergoing major surgery. We aim to re-audit this after presenting at the departmental meeting.

## 08AP03-7

### Risk stratification by high-sensitivity troponin T and mid regional proadrenomedulin prior to major non-cardiac surgery

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**Background and Goal of Study:** The aim of this study is to determine the usefulness of preoperative values high-sensitivity troponin T (hs TNT) and mid regional proadrenomedulin (MR-pro ADM) prior to major non-cardiac surgery. We aimed to evaluate the incremental values of hs TNT and MR-pro ADM for risk stratification prior to non-cardiac surgery when combined to the revised cardiac risk index from Lee at all (RCRI).
**Materials and methods:** This prospective, single center, observational study enrolled 91 patients undergoing major non-cardiac surgery. Inclusion criteria were non-emergent major non-cardiac surgery, age above 55 years old and at least one cardiovascular risk factor. Hs TNT and MR-pro ADM were sampled 48 hours prior to the procedure. The primary endpoint was composite of in-hospital mortality, acute myocardial infarction, cardiac arrest, cardiopulmonary resuscitation, and acute decompensated heart failure. Further, we assessed the net reclassification improvement when combining hs TNT to the RCRI and both biomarkers to the RCRI.
**Results and discussion:** In 91 patients, undergoing major non-cardiac surgery 9 (9.89%) died within 14 days of their hospitalization. Concentrations of adrenomedullin and hs TnT were statistically higher in deceased patients than in survived (1.66±1.23 vs 0.67±0.43, p<0.001), 18.09±17.86 vs 9.79±18.32, p=0.005, respectively). The area under the curve (AUC) for the 14-day mortality receiver operating characteristic (ROC) curve was 0.581 (p=0.358) for RCRI, 0.713 (p=0.016) for hs TnT, 0.887 (p<0.001) for adrenomedullin (MR-proADM).
**Conclusion(s):** The prognostic information by preoperative hs TNT and MR-pro ADM measurements significantly improved risk stratification prior to major non-cardiac surgery compared to the RCRI. High preoperative MR-proADM or hsTnT is a strong and independent predictor of perioperative major cardiovascular event in non-cardiac surgery. The predictive power of current clinical risk evaluation system would be strengthened by these biomarkers.

## 08AP03-9

### Multimodal prehabilitation and major complications after colorectal surgery for cancer: the impact of improving preoperative functional capacity

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**Background and Goal of Study:** Multidisciplinary consensus agrees on the necessity to reduce major complications after abdominal surgery, as these represent a significant burden to patients and society. Multimodal prehabilitation programs comprising physical exercise, nutritional and anxiety-coping interventions have been shown to improve perioperative functional capacity in a greater proportion of patients. The impact of this improvement on major complications has not been investigated yet. The purpose of this study is to determine whether a preoperative functional improvement reduces the incidence of major complications after colorectal surgery.
**Materials and methods:** Data of 109 participants enrolled in three previous randomized controlled trials were analyzed. All participant underwent a 4-week multimodal prehabilitation program before colorectal surgery. Functional capacity was assessed with a six-minute walking test (6MWT), a validated measure of surgical recovery. As the minimal clinically important difference of 6MWT is estimated at 20 m, two groups were defined as follows: group A included participants whose preoperative change in 6MWT was less than 20 m (n=48) and group B included those whose change in 6MWT was greater than 20 m (n=61). Complication severity was graded according to the Clavien-Dindo classification and those graded as III-V were defined as major. Primary outcome was the incidence of major complications.
**Results and discussion:** There were no significant baseline differences between the groups for age, gender, BMI, ASA, Charlson Comorbidity Index, CR-POSSUM scores, cancer stage, surgical procedure and approach, duration of surgery and intraoperative blood loss. Participants in group B had a lower baseline 6MWT than group A (406.8 m [IQR 377.6-436.0] vs 448.0 m [IQR 419.2-477.0], p=0.05). There were six (14%) major complications in group A and one (1.6%) in group B (p=0.042).
**Conclusion(s):** Preliminary data indicate that patients who achieved a preoperative improvement in functional capacity are more likely to have less major complications after colorectal cancer surgery.

## 08AP03-10

### Impact of perioperative administration of a chloride-depleted glucose 5% and potassium-based crystalloid solution on gastrointestinal recovery, electrolyte balance and renal function after radical cystectomy and urinary diversion: results of a randomized clinical trial

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**Background and Goal of Study:** Open radical cystectomy with urinary diversion is known to have a high complication rate and a high risk of delayed return of gastrointestinal function postoperatively. The goal of this study is to

determine if perioperative administration of a chloride-depleted glucose 5% and potassium-based crystalloid solution accelerates return of normal bowel function.

**Materials and methods:** Randomized, parallel-group single-centre trial including 44 consecutive patients undergoing open radical cystectomy with urinary diversion receiving either a glucose 5% potassium-based crystalloid solution (G5K group) or a balanced crystalloid solution (Ringerfundin® control group) perioperatively in the setting of a fluid management aiming for a zero balance and a postoperative enhanced recovery. The primary endpoint was the return to normal defecation. Secondary endpoints were renal dysfunction and need for electrolyte substitution. Data were analysed using non-parametric statistical models. Multiple linear regression analysis was conducted.

**Results and discussion:** The groups were comparable regarding surgical characteristics, length of stay, intraoperative parameters and fluid administration (G5K group: 750ml [500-1700ml] vs. control group 975ml [400-1600ml], $P=0.185$) and amount of fluid administered postoperatively (G5K group: 4750ml [4000-6000ml] vs. control group 5250ml [4000-6000ml], $P=0.941$). Normal defecation occurred significantly faster in the G5K group (138h [54.0-261.5] than in the control group (169.0h [108.0-318.0]; $P<0.001$). This was confirmed by multiple linear regression analysis (regression coefficient: -47.25 SE: 15.35; $P=0.004$). As a safety endpoint, the incidence of renal dysfunction at discharge was similar for the G5K (9.1%) and control group (4.0%) staged as RIFLE "risk"; $P=1.000$, while the need for substitution of magnesium and potassium was significantly lower in the G5K group (13.6% and 18.2%, respectively) than in the control group (54.6% and 77.3%, respectively; $P=0.010$ and $P<0.001$). The limitation of this study is realisation in a high caseload centre. Whether the results are reproducible in other centres needs to be shown.

**Conclusion(s):** Perioperative administration of a chloride-depleted glucose 5% and potassium-based crystalloid solution accelerates recovery of bowel function after open radical cystectomy with superior safety by reducing the need for potassium or magnesium substitution without affecting renal function.

## 08AP03-11

### Evaluation of the peri-operative role of CPET in a randomised high risk surgical population; a service evaluation project

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**Background and Goal of Study:** A patient's ability to respond to the physiological demands of surgery is heavily reliant on their cardio-pulmonary function.[1] CPET represents a non-invasive simulation of the cardio-pulmonary stresses incurred during major surgery. Preoperative evaluation and risk stratification are valuable only if they allow joint decision making to reduce perioperative morbidity and mortality.[2]

This project was initiated to evaluate the impact of high risk CPET result on our perioperative management plans for major abdominal surgeries and clinical outcomes.

**Materials and methods:** Retrospective analysis of 122 patients undergoing elective major abdominal surgery, from 04/2009 to 10/2015, was performed. Eighty of these patients were deemed high risk on CPET testing, with perioperative mortality of 4.6% (AT <11). Forty-three case notes from this group were randomly selected for analysis. We reviewed decision making based upon CPET results, anaesthetic management, postoperative critical care, allocation of resources, morbidity and mortality and the length of hospital stay.

**Results and discussion:** The patient and medical team chose conservative management in 49% of cases, due to high morbidity and mortality risk. Surgery was performed in the remaining cases. Despite perioperative optimisation, significant complications occurred within 21 days of surgery. Morbidity rates were: 30% cardiac related, 15% ileus, 10% sepsis and 10% of cases requiring ITU admission; no deaths occurred.

We found that the high risk CPET result aided judgement on whether or not to proceed with surgery and focused allocation of resources to this group. All patients had their surgery performed by a consultant with all but one anaesthetised by a consultant. Critical care beds were booked in all cases with their admission postoperatively discussed and planned with critical care consultant.

**Conclusion(s):** Patient specific risk stratification was the main advantage of CPET, as the high risk result facilitated quantitative and collaborative patient and clinician decision making. The high risk CPET result also enabled us to individualise perioperative management plans based on anticipated outcomes.

**References:**
1. Balady GJ, et al. Clinician's guide to cardiopulmonary exercise testing in adults. Circulation. 2010; 122:191-225.
2. Levett DZ and Grocott MP. Cardiopulmonary exercise testing, prehabilitation, and enhanced recovery after surgery (ERAS). Can J Anesth 2015; 62:131-142

## 08AP03-12

### Goal directed hemodynamic therapy decresases postoperative complications. Results from a multicenter randomized controlled trial

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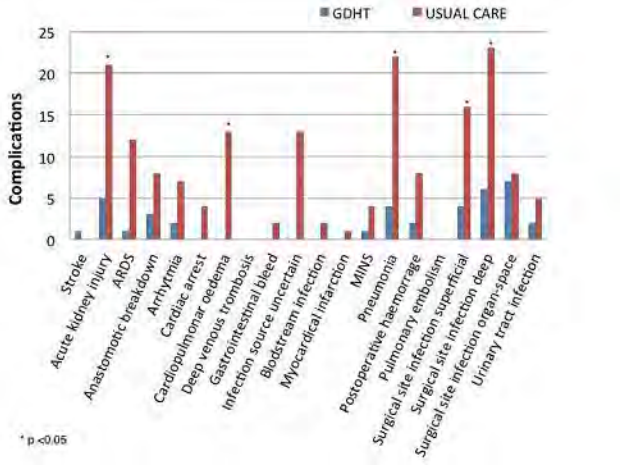
**Background and Goal of Study:** Goal directed hemodynamic therapy (GDHT) has been associated with a reduction complication rates after mayor surgery. The aim of the study was to evaluate the postoperative complications in patients undergoing mayor elective surgery using GDHT guided by measures stroke volume (SV), mean arterial pressure (MAP) and cardiac index (CI) by esophageal Doppler monitoring (EDM) through administering fluids, inotropes and vasopressors.

**Materials and methods:** Prospective, multicenter, randomized, unfunded controlled trial (ISRCTN93543537). After ethical committee approval and written informed consent were obtained, we enrolled adult ASA I-III patients scheduled for elective major surgery (gastrointestinal, urological, gynaecological and orthopaedic). Randomization and allocation to trial group were carried out by a central computer system. In the control group (CG), intraoperative fluid therapy was administered according to conventional practice. In the GDHT group (GG), the intraoperative goals were to maintain and optimal SV, a MAP >70mmHg, and a CI >= 2.5 L/min/$m_2$. Complications and Outcome data were recorded up to 180 days postoperatively. Primary outcome was postoperative complications.

The qualitative variables are described frequency distribution and quantitative in mean and standard deviation (SD) or median and interquartile range (IQR), if asymmetry. Study groups were compared according to the recommendations of the CONSORT standards. The study was completed by low recruitment, once reached statistical power.

**Results and discussion:** 450 patients were randomized to the GG (n=224 patients) or to the CG (n=226 patients). 428 were analyzed. The number of complications was significantly lower in the GG (56 complications vs. 198 complications, p<0.01); as the number of patients with complications 15% vs 27.6% p=0.001, OR: 0.46 CI 95% 0.29-0.75 (Relative Risk Reduction 56.4%), certain specific complications (Figure 1) and length of stay: Median IQR 5 (4-10) vs 7 (7-12) p 0.002.




*[Figure1]*

**Conclusion(s):** GDHT using SV, CI trending and MAP as the key parameters leads to a decrease in postoperative complications in patients undergoing major surgery.

## 08AP04-1

### Total hip arthoplasty revision surgery: does preoperative haemoglobin value mean something?

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**Background and Goal of Study:** Allogenic blood transfusion (ABT) may be necessary in major orthopaedic surgery that involves extensive soft tissue release and bone cuts. Pre and postoperative anemia is prevalent and its early recognition and management is crucial in order to reduce the frequency of ABT, which is associated with 20% complications and increased medical costs.
We aimed to evaluate the ABT need and its incidence after total hip arthoplasty revision surgery (THARS) in our hospital and to compare previous preoperative haemoglobin in those who ended up being transfused and those who weren't. We also pretended to identify patients with increased risk of ABT.
**Materials and methods:** This was an observational, cross sectional, retrospective study of all patients submitted to THARS, between January 2011 and December 2013. We analyzed demographic data, ASA physical status, preoperative and, whenever it occurred, pretransfusional haemoglobin values. The statistic analysis was performed with *SPSS 21* with *t-Student test.*
**Results and discussion:** In this period, 68 patients were submitted to THARS, 31 patients (45,6%) were transfused and 37 patients (54,4%) were not. The mean preoperative haemoglobin values were 12,41 mg/dL and 13,37 mg/dL, respectively ($p<0.05$). 37 (54,4%) patients were ASA II and 31 (45,6%) were ASA III. 37 (54,4%) patients were female and 31 (45,6%) were male.
**Conclusion:** Anaemia management must be carefully addressed in our preoperative evaluation, improving patient outcomes and reducing the need for ABT and its eventual adverse effects, as well as reducing overall costs. This study suggests that transfusional incidence is dependent of preoperative haemoglobin value, which can be optimized prior to surgical intervention. However, population and surgeon factors may have influenced the results and were not taken into account in this study and therefore further research is necessary.

## 08AP04-2

### The effect of in-vitro fertilization on coagulation parameters as measured by Thromboelastogram

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**Background and Goal of Study:** In Vitro Fertilization (IVF) induced elevated estrogen levels are associated with a hypercoagulable state.
Thromboelastogram (TEG) is a point of care whole blood hemostasis analyzer which measures functionality of clotting parameters.
Our study's objective was to examine the influence of the early and late follicular phase of an IVF simulation cycle on coagulation parameters as measured by TEG and to evaluate the influence of age on coagulation parameters.
**Materials and methods:** In a single center, prospective, observational trial, 46 women undergoing IVF therapy were studied. All women received a standardized IVF treatment protocol. Venous blood was drawn on the first day of the stimulation cycle and on the day of hCG injection and assessed by TEG. Parameters assessed by were R (represent clotting time), K and Angle (reflect clot strength and development) , MA (maximum platelet-fibrin clot strength), CI (represents overall coagulability), and LY30 (represents lysis).
**Results and discussion:** Data from 46 women was analyzed. A statistically significant difference was found in all TEG parameters between early and late follicular phase, indicating a hypercoagulable state. R ($p<0.0001$), K ($p=0.008$), Angle ($p= 0.008$), MA ($p=0.004$), CI ($p<0.001$), LY30 ($p=0.59$). Age was a significant independent predictor for R at the early follicular phase, ($p=0.042$). Both age and estrogen levels were found to be independent predictors for CI at late follicular phase. Age ($p=0.011$), Estrogen ($p= 0.019$).
**Conclusion:** There was a significant difference in all coagulation parameters between early and late follicular phase, indicating a hypercoagulable state.

## 08AP04-3

### Guidance by peri-operative transfusion trigger score (POTTS) decreases RBC transfusion in surgical oncology patients: a prospective, randomized, controlled trial

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**Background:** Transfusion for surgical oncology patients during peri-operative period is controversial. Based on the physiology of the balance between oxygen supply and consumption, we suggested Peri-Operative Transfusion Trigger Score (POTTS, Fig 1) to objectively evaluate the status of oxygen supply/consumption for each individual patient with Hb between 6~10g/dl, and we hypothesized that this individualized transfusion strategy would reduce perioperative red blood cells (RBCs) transfusion and be as safe as restrictive and liberal transfusion strategies.
**Materials and methods:** We enrolled 322 patients who were aged more than 14 years undergoing elective surgery for curative cancer with perioperative Hb level <10 g/dl. Patients were randomly assigned to the POTTS group (transfusion threshold under guidance of POTTS, n=93), the restrictive-strategy group (transfusion according to current practice guidelines in China, n=126), or the liberal-strategy group (transfusion threshold of 10g/dl, n=103). The primary outcome was the proportion of patients who received RBCs transfusion and the units of transfused RBCs.
**Results:** RBCs transfusion rates were 33.3%, 58.7% and 94.2% in the three groups ($P<0.001$), respectively. A median of 0 unit of RBCs was transfused in the POTTS group, as compared with 2 units in the restrictive-strategy group and 3 units in the liberal-strategy group ($P<0.001$). There was no 30-day mortality in the POTTS group, one death (0.8%) in the restrictive-strategy group and 5 deaths (4.9%) in the liberal-strategy group, with a statistically significant difference between the POTTS group and the liberal-strategy group ($P=0.03$). Serious postoperative complications occurred in 17.2% of patients in the POTTS group, 14.3% in the restrictive-strategy group and 20.4% in the liberal-strategy group ($P=0.47$). One year follow-up data were available for 163 patients. The Kaplan-Meier analyses demonstrated 1-year overall survival did not differ significantly ($P=0.77$) and 1-year disease-free survival was also similar ($P=0.95$) among the three groups.
**Conclusions:** As compared with restrictive transfusion and liberal transfusion strategies, an individualized transfusion strategy under guidance by POTTS significantly decreased perioperative erythrocyte transfusion without increased 30-day mortality and morbidity, or decreased 1-year overall survival and 1-year disease-free survival.

| Points added | Adrenaline infusion rate | $FiO_2$ to keep $SpO_2$ ≧95% | Core body temperature | History of Angina |
|---|---|---|---|---|
| 0 | Not required | ≤35% | <38℃ | No |
| +1 | ≤0.05μg/kg.min | 36-50% | 38~40℃ | On exertion |
| +2 | ≥0.06μg/kg.min | ≥51% | >40℃ | During normal daily living or at rest |

**POTTS is a dynamic score that to be assessed whenever the decision of allogeneic RBCs transfusion is needed, and it should be carried out when the patient's volume status is clinically normal assessed by senior clinicians.**
**The initial score is 6, and the final POTTS score is the sum of all points plus 6, that is 6, 7, 8, 9, 10, or >10. The score means the RBCs transfusion trigger and target of Hb level of 6, 7, 8, 9, or 10g/dl.**
**If POTTS score ≥10, patients will be managed as if the POTTS score is 10, which means Hb level should be maintained not less than 10g/dl during peri-operative period.**

*[Figure 1. Peri-Operative Transfusion Trigger Score, POTTS]*

## 08AP04-4

### Observational study for the assessment of platelet function in anesthetized patients (AGREE Study)

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**Background and Goal of Study:** Many surgical patients regularly receive non-steroidal anti-inflammatory drugs (NSAIDs) for postoperative pain treatment. Its action mechanisms include COX-1 inhibition, similar to the antiplatelet action of the aspirin. The goal of AGREE is to determine the antiaggregant effect of NSAIDs given at the end of surgery in order to prevent postoperative pain.

**Materials and methods:** AGREE is a pilot, prospective, observational study, approved by the hospital ethical committee. A group of surgical patients over 18 years, not having received any medication that could have disturbed haemostasis within seven days before the intervention were included after obtaining informed consent. Acetaminophen (1g) and Dexketoprophen (50mg) was administered intravenously to every patient 30-45' before the end of the surgery. Platelet function was tested with the aspirin aggregation test using the point-of-care test VerifyNowâ (Accumetrics, Inc., San Diego, CA-USA). Results are expressed in ARU (Aspirin Reactive Units): ≥550 ARU is consistent with normal platelet reactivity without dysfunction related with aspirin, and <550 ARU is consistent with platelet dysfunction related with aspirin. Two blood samples were obtained: (T1) 30' (+/-10') before the administration of the analgesia protocol; (T2) 20' (+/-10) after the administration ended.
**Results and discussion:** 12 patients were included (3/9 male/female, 10/2 ASAII/III), median age 57 years (range 39-77). 11/12 presented a normal platelet reactivity result before the administration of the analgesia protocol (T1). From those 11 patients with >550 ARU, 10 changed the profile, showing platelet dysfunction after the NSAID infusion (T2) (see table).

| | PATIENT | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | ARU Pre-NSAID | 552(#) | 556(*) | 577(*) | 621(*) | 650(*) | 543(#) | 601(*) | 620(*) | 601(*) | 652(*) | 636(*) | 606(*) |
| T2 | ARU Post-NSAID | 386(#) | 589(*) | 537(#) | 409(#) | 387(#) | 466(#) | 523(#) | 425(#) | 523(#) | 512(#) | 407(#) | 386(#) |

(*)= no platelet dysfunction (#)= platelet dysfunction

*[Table]*

**Conclusion(s):** In most cases NSAID administration as analgesia protocol produces platelet impairment similar to the one produced by aspirin. Although further studies are required to determine if NSAID administration could increase postoperative bleeding, in weak and elderly patients caution should be advised.

## 08AP04-5

### The role of preoperative bridging for thromboembolic events and major bleeding after fast-track hip and knee arthroplasty in patients with preoperative vitamin-K antogonists

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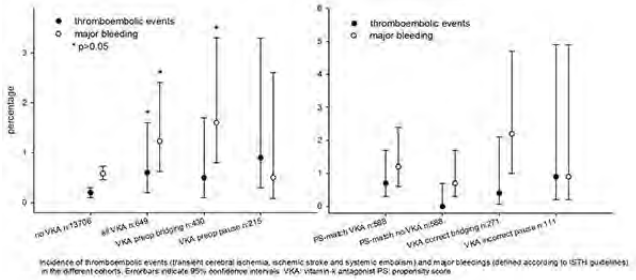
**Background and Goal of Study:** Benefits of preoperative bridging in patients with preoperative vitamin-K antagoists (VKA) is debatable (1). The purpose of this study was to investigate the occurrence of thromboembolic events (TE), and major bleeding (MB) in VKA patients having fast-track total hip (THA) and knee arthroplasty (TKA) in relation to preoperative bridging.
**Materials and methods:** Observational multicenter cohort study in consecutive patients between Jan 2010 and Nov 2013. Prospective data on preoperative anticoagulants and comorbidity. 30-days follow-up through the Danish National Patient Registry and patient records. Study reporting and definitions on TE and MB were according to International Society of Thrombosis & Haemostasis guidelines (2).
**Results and discussion:** Of 13706 procedures 649 (4.7%) were in VKA patients (76.3% with atrial fibrillation), of whom 430 (66.3%) were bridged and 215 (33.1%) paused. There were 4 (0.6% 95%CI:0.2-1.6%) vs. 23 (0.2% CI:0.1-0.3% p=0.037) TEin patients with and without VKA, respectively. In VKA-patients, 2 TE were in both bridged (0.5% CI:0.1-1.7%) and paused VKA-patients (0.7% CI:0.2-2.6% p=0.644). There were 8 MB in all VKA-patients (1.2% CI:0.6-2.4%) with 7 in bridged VKA-patients (1.6% CI:0.8-3.3% p=0.006) vs. 76 (0.6% CI:0.5-0.7% p=0.038) in patients without VKA.




Incidence of thromboembolic events (transient cerebral ischemia, ischemic stroke and systemic embolism) and major bleedings (defined according to ISTH guidelines) in the different cohorts. Errorbars indicate 95% confidence intervals. VKA: vitamin-k antagonist PS: propensity score

*[Fig1]*

Similar results were found in a propensity matched cohort with and without VKA and in patients who received correct bridging vs patients who should have, but did not, receive bridging according to guidelines from the European Society of Cardiology and European Society of Anaesthesiology (3).
Our results are consistent with those of a recent randomized study on bridging in patients with atrial fibrillation, but this included various mainly minor surgical procedures (1).
**Conclusion(s):** VKA-patients had more TE and MB after fast-track THA and TKA, due to increased MB in bridged VKA-patients. Further trials are needed to clarify indications for preoperative bridging in THA and TKA.
**References:**
1. Douketis JD et al. N Engl J Med 2015;373:823-833.
2. Spyropoulos AC et al. J Thromb Haemost 2012;10:692-694.
3. Kristensen SD et al. Eur Heart J 2014;35:2383-2431.

## 08AP04-6

### Tranexamic acid reduces blood transfusion in burns surgery: a retrospective single-centre study

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**Background and Goal of Study:** Burn excision can lead to major blood loss and coagulopathy. Despite the haemostatic methods in burn surgery the use of blood products has increased in recent years.[1] The adverse effects of allogeneic blood products and their limited availability and high costs quested for strategies to reduce perioperative transfusion. Tranexamic acid (TXA) use in burns is lacking evidence despite its common use in trauma and has safety concerns due to the predisposition of venous thromboembolic events (VTE) in burns.[2] Our goal was to assess the safety and efficacy of TXA to reduce red blood cells (RBC) transfusion in burn surgery.
**Materials and methods:** A retrospective study enrolled patients admitted to the Burn Unit of Hospital of Santa Maria, between Jan 2011 and Dec 2014. Non-surgical burn patients were excluded. Ninety patients were included from 199 admitted during the 4-year period reviewed and divided into 2 groups. Group A included patients admitted in 2011 and 2012 without TXA administration. Group B included patients admitted in 2013 and 2014, all submitted to perioperative intravenous TXA scheme (1 g bolus preop + 1 g infusion intraop). RBC was guided by a haemoglobin trigger of 10 g $dl^{-1}$. Other blood component therapy was guided by clinician's discretion. Data collection included transfusion requirements, total body surface area burnt (% TBSA), number of surgeries and length of stay. Blood loss parameter was not available on registers.
**Results and discussion:** Group A (without TXA) included 37 patients and group B (TXA) included 53 patients, fairly similar in age [mean (median/interquartile range) - 53.3 (55/31)] vs 52.9 (41/25) and sex. Although group B recorded a higher % TBSA [21% (17/18) vs 16.5% (15/15)], these patients required a lower RBC transfusion [17 (9/15) vs 19.8 (15/19)]. FFP and platelets transfusion was similar in groups. Moreover, both the number of surgeries [2 (1/1) vs 2.8 (2/3)] and the length of hospital stay [37 (28/20) vs 51 (45/36)] were lower in this group, hypothesizing a benefit of TXA in bleeding and clinical recovery. No VTE occurred.
**Conclusion(s):** TXA in burns surgery performs to be safe and effective in reduction of blood transfusion. Further research is required to clarify the optimum route of administration and clinical outcomes (mortality, blood transfusion requirement, VTE and graft take).
**References:**
1. Curinga G, et al. Burns 2011;37:742-52;
2. Walsh K, et al. Burns 2014;40(5):1055-7.

## 08AP04-8

### Financial implications of allogenic blood transfusion: cost analysis in a Portuguese hospital

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**Background and Goal of Study:** Transfusion of allogeneic red blood cells (RBC) carries many risks, but also costs. In Portugal, one unit of RBC is estimated to cost €536 - €875 [1] and the daily average cost of being hospitalized is €880 [2]. Primary arthroplasty is a surgery of special concern due to an el-

evated risk of blood loss and associated high prevalence of blood transfusion, varying from 16 to 70% [3,4]. Due to this risk of blood loss, we intend to evaluate in our hospital the transfusion rate for Total Hip and Knee Replacement surgery (THKR), the amount of units transfused, the prevalence of anemia and the impact of transfusion in the length of stay.
**Materials and methods:** In this retrospective study, we reviewed all the elective THKRs in our hospital during one year (2014-2015), consisting of 246 patients, to identify measures that could be used to evaluate the economic impact of the implementation of Patient Blood Management. All reported P values are two-tailed, with a P value of 0,05 or 0,01 indicating statistical significance. Analyses were performed with the use of SPSS software, version 22.
**Results:** Overall transfusion rate was 18% and the incidence of anemia of 9% (according to World Health Organization criteria). 39% of patients with pre-operative anemia were transfused. Transfused patients received a mean of 1.79 ± 0.742 units of RBC and had longer hospital stays (p<0,01), staying more 2,6 days than those who were not transfused (9,4 ± 5,0 days and 6,8 ± 2,6 days, respectively).
**Discussion and conclusions:** Besides the known transfusions risks, patients receiving allogenic RBC represented an additional cost of €3,247 - €3,854 to the hospital, comparing to those who were not transfused. This translates into a yearly extra cost of €139,621 - €165,722 in the reviewed patients, just accounting for the price of RBC and length of stay in THKR surgeries. This data could be used to raise awareness regarding the costs of transfusion in orthopedic surgery and potentiate the implementation of patient blood management protocols in our hospital.
**References:**
1. Acta Med Port 2013 Sep-Oct;26(5):487-489
2. https://www.ers.pt/pages/73?news_id=883
3. J Orthop Surg Res. 2015 Mar 28;10:48.
4. British Journal of Anaesthesia 108 (6): 943-52 (2012)

## 08AP04-9

### Perioperative blood loss management in total hip and knee replacement: a one year review

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**Background and Goal of Study:** Blood loss is a major concern in hip and knee replacement and it is not without concerns and complications. Accordingly, there is a high rate of blood transfusion in these settings, varying from 16-70% from Literature. As a consequence, in our hospital, it is current practice to screen and save 2 units of blood for each patient schedulled for the procedure. We intend to study our population in order to infer measures that could reduce transfusion requirements and associated risks.
**Materials and methods:** This was a retrospective study of all elective total knee and hip replacement in a 12 month period in our hospital. 246 patiens were studied to identify predictors of blood loss and transfusion requirements. Descriptive statistics are presented as percentage for categorical variables and mean +/- SD for continuous variables. Comparisons were made using the Student t-test or chi-square test, as appropriate. All reported P values are two-tailed, with a P value of 0,05 indicating statistic significance. Analyses were performed with the use of SPSS software, version 22.
**Results and discussion:** Our population, had 62,2% females and 37,8% males, with a total transfusion rate of 18% (p<0,01). This was higher among female population with a transfusion rate of 24% over 8% in men (p<0,01). Greater transfusion requirements were associated with lower preoperative hemoglobin (p<0,01), higher hemoglobin variation pre and postoperative (p<0,01) and female sex (p<0,01). Patients with a pre-operative hemoglobin less than 12,6 +/- 1,1g/dl and with a hemoglobin variation of 4,6 +/- 1,3 g/dl were more frequently transfused (p<0,01).
**Conclusion(s):** Lower pre-operative levels of hemoglobin were associated with a higher percentage of transfusion. This demonstrates that efforts should be made to optimize our strategy to improve these values the best possible way we can in order to minimize transfusion requirements and complications. Having identified at risk patients for allogenic blood transfusion, should make us reconsider, in the future, the need to group and save blood for all patients, avoyding unnecessary costs, wastes, complications for patients and lenght of stay.
**References:**
J Orthop Surg Res. 2015 Mar 28;10:48.
British Journal of Anaesthesia 108 (6): 943-52 (2012)
International Orthopedics. 2007 31: 39-44.

## 08AP04-10

### The activated clotting time can be used to monitor residual heparin after discontinuing intravenous administration of heparin for antithrombotic prophylaxis

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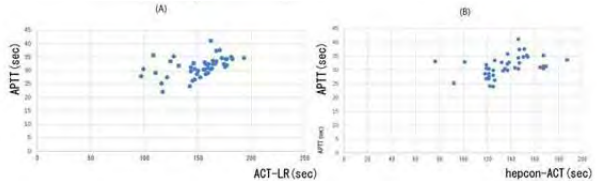
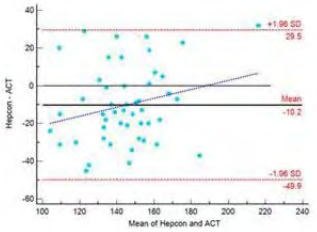
**Background:** Regional anesthesia on patients who have been treated with heparin can induce hemorrhagic complications, making it important to evaluate coagulation abnormalities by point-of-care tests. This study compared point-of care tests with tests of anti-Xa activity to ensure the safety of regional anesthesia after discontinuing heparin administration for at least 6 hours before surgery.
**Methods:** This study included 54 patients who required preoperative heparin therapy for antithrombotic prophylaxis. Blood samples were drawn from the venous line before anesthesia induction. Activated coagulation time-low range (ACT-LR), activated partial thromboplastin time (aPTT), and whole blood and plasma heparin concentrations were compared. Plasma heparin concentrations were measured using an automated chromogenic assay. ACT-LR and whole blood heparin concentration were measured using the Hemochron Jr II Signature and Hepcon HMS instruments, respectively.
**Results and discussion:** Patients received a mean preoperative heparin dose of 16195±6546 IU/day, which was halted an average 9.2±2.7 hours before induction of anesthesia. All patients had anti-Xa activities below 0.1U/ml before anesthesia induction, with undetectable heparin levels by hepcon HMS. Previous results, showing that plasma heparin concentrations higher than 0.20 U/mL were associated with hemorrhagic complications, indicated that the risk of hemorrhage in these patients would be negligible. However, ACT-LR values in 23 patients (42.6%) and hepcon-ACT values in 11 (20.4%) were higher than the threshold value of 150 s, which might detect low concentrations of heparin. Correlation coefficients showed that APTT was more strongly correlated with ACT-LR (r = 0.633) than with hepcon-ACT (r = 0.446; Fig 1). A Bland-Altman plot showed poor agreement between hepcon ACT and ACT-LR (Fig. 2), indicating that these two measurements are not equivalent.
**Conclusions:** Regional anesthesia after discontinuing heparin therapy at least 6 hours before surgery may be safe. However, the discrepancy between actual heparin levels and ACT values suggest the need to formulate new thresholds for ACT.




*[Figure 1. Box plot showing the relationship between activated partial thromboplastin time (APTT) and ACT-LR (A) and Hepcon HMS-ACT (B)]*




*[Figure 2. Bland-Altman plot of difference in ACT and against mean of ACT measured by hecon and Hemochron_Jr II Signature]*

## 08AP04-11

### Regional complications, vascular thrombosis and prevention of hemorrhage associated with intra-articular tranexamic acid in total knee arthroplasty: a cohort study

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**Background and Goal of Study:** Patients undergoing total knee arthroplasty (TKA) are at risk of significant perioperative blood loss. Surgical site infection (SSI, including prosthetic joint infection) is one of the causes of TKA failure, and it is associated with significant morbidity. Intravenous tranexamic acid (TXA) has been recommended to decrease associated blood loss, and it has not been shown to increase adverse events such as venous thromboembolic disease (VTD). Intra-articular TXA (IA-TXA) is also recommended, but there are not enough studies about regional associated complications (surgical site infections-SSI-, aseptic mobilization-AM-, or periprosthetic fracture-PF-). Our hypothesis is that IA-TXA is a useful preventive treatment to reduce hemorrhage associated with TKA without increasing the risk of thrombotic or regional complications.
**Materials and methods:** With the authorization of our institutional investigation committee, an observational retrospective cohort was performed to study the effect of 2 different preventive blood loss programs. Not exposed group (group A) and exposed group (group B), differed only at exposition at 3 grams of IA-TXA, developed during different years. Groups were operated by the same team with large TKA experience and with the same prosthetic model. Perioperative hemorrhage (hemoglobin loss > 2 g/dl, and transfusion rates), VTD and arterial thrombosis (stroke, ischemic cardiopathy…) until 1st postoperative year, and regional complications till 3rd postoperative year were analyzed.
**Results and discussion:** A total of 200 patients were analyzed, 100 randomized outpatients per group. ASA III and IV were more frequent at group B (RR 1,3; p=0,032), so this group had more basal preoperative risk of general complications. Basal hemoglobin was similar (13,8 g/dl at group A Vs 13,9 at group B). Hemoglobin loss > 2 g/dl was more frequent at group A (RR 0,81; p<0,001), as transfusional rates (RR 0,12; p<0,001). VTD and arterial thrombosis were similar (0% & 2% respectively at group A Vs 1% & 1% at group B). Regional complications were similar (7% SSI at group A Vs 5% at group B; 1% AM at group A Vs 3% at group B; 3% PF at group A Vs 0% at group B).
**Conclusions:** IA-TXA reduces hemorrhage and transfusion associated with TKA, and it does not seem to increase the risk of associated regional complications neither vascular thrombotic events. More studies about regional IA-TXA associated complications are needed.

## 08AP04-12

### To which hemoglobin value should we care?

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**Background and Goal of Study:** Allogenic blood transfusion (ABT) may be need in major orthopaedic surgery that involves extensive soft tissue release and bone cuts. Pre and postoperative anemia is prevalent and its early recognition and management is crucial in order to reduce the frequency of ABT, which is associated with 20% complications and increased medical costs.
We aimed to evaluate the ABT need and its incidence after knee arthoplasty review surgery (KARS) in our hospital and to compare previous preoperative hemoglobin in those who were transfused and those who weren't. We also pretended to identify patients with increased risk of ABT.
**Materials and methods:** This was an observational, cross sectional, retrospective study of all patients submitted to KARS, between January 2011 and December 2013. We analysed demographic data, ASA physical status, preoperative hemoglobin value and pre transfusional hemoglobin value whenever it occurred. The statistic analysis was performed with *SPSS 21* with *t-Student test.*
**Results and discussion:** This study included 41 patients submitted to KARS with an average of 73 years old. 33 (80%) of the patients were female. Using ASA Classification of Physical Status, type II was more frequent (63,42%).
18 (40%) of patients were transfused (TG) and 23 (60%) were not transfused (NG). The average of pre value hemoglobin on transfused group was Pretransfusional haemoglobin in group TG was 12,023 and in group NG was 13,052 (p<0,05).
There was missing data on pretransfusional hemoglobin value.
Anaemia management must be a goal in our preoperative evaluation, improving patient outcomes and reducing the need for ABT and the eventual adverse effects associated as well as reducing overall costs.
**Conclusion:** This study suggests that transfusional incidence is dependent of preoperative hemoglobin value that can be optimized prior to surgical intervention. However, population and surgeon factors may have influenced the results and were not taken into account in this study and therefore further research is necessary.

## 08AP05-1

### Unmasking thyrotoxicosis in the operating room

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**Background:** Thyrotoxicosis is a known cause of thyroid storm (TS) in patients exposed to triggers like surgery or infection.[1] TS is a rare life-threatening health condition, with a mortality rate of 10 to 30%. The diagnosis is primarily clinical without specific signs or symptoms.
**Case report:** A 27 years-old female patient was scheduled for esthetic breast reduction surgery (BMI 28,1Kg/m). In the preoperative anaesthetic visit she was classified as ASA I. Her past medical history includes an uneventful caesarean-section with epidural anaesthesia. In the day before surgery she presented BP 120-80 mmHg, HR 85 bpm and 36.8ºC of temperature. Blood count was normal. ECG: sinus tachycardia 110 bpm. At admission to the OR she was anxious, with BP 175/90 mmHg, narrow complex tachycardia of >160 bpm and 36.9ºC of temperature. We administered 2 mg of midazolam intravenous and performed vagal maneuverers without hemodynamic effect. We decided to postpone the surgery and performed a detailed analytic evaluation. 2 hours later: BP 138/83 mmHg; HR 141 bpm, sinus rhythm and normal echocardiogram. Biochemistry: TSH 0,0 UI/mL; free T4 2,9 ng/dL; free T3 17,22 pg/mL, leading to a diagnosis of thyrotoxicosis probably from Graves' Disease. With a orientated to the problem clinical interview we identified irritability, diaphoresis and insomnia in the last 3 months, without hypertension, palpitations or weight loss. Physical examination revealed hand tremors, slight exophthalmia and palpable goitre. She was prescribed with propranolol and methibazole and referred to an endocrinologist appointment.
**Discussion:** Tachycardia and hypertension in a young patient, with overweight, can have a variety of diagnosis. Thyrotoxicosis is a rare event that demands the anaesthesiologist to be alert to its occurrence. Signs of thyroid storm include fever, rise in $PaCO_2$, acidosis, hyperventilation, cardiovascular, neurologic or gastrointestinal dysfunction. Treatment should be immediately started, as delays could be fatal.
**Reference:** 1. HKMJ Vol 7 No 3 September 2001
**Learning points:** Thyroid pathology's symptoms can have a subtle beginning making diagnosis difficult, essentially when the phenotype is atypical. In the absence of a diagnose, having a high suspicious index can be the only way to, avoid serious complications in those patients. The anaesthesiologist should have an active role in the diagnosis and clinical management.

## 08AP05-2

### What hides lithotomy position?

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**Background:** Compartment syndrome after surgery in lithotomy position is a rare but devastating complication if early diagnosis and treatment is not performed.The appearance of the compartment syndrome is a result of increased compartment pressure which causes a decrease in perfusion pressure that compromises the viability of the tissues. Although the pathophysiology is poorly understood, it is believed that this complication is due to several factors like lithotomy position, type of leg support, support points, operation time, sustained hypotension and the comorbidities.
**Case report:** A 39-year-old woman with no relevant medical history was referred for gynecological surgery (Laparoscopic histeropexia + perineoplasty).

Surgery was performed under general anesthesia. The patient was stable hemodynamically but a tendency to hypotension was appreciated.Operation time 6 hours.
Patient was observed in recovery room after surgery. During the night the patient presented severe pain in her right foot which increased with passive extension of the muscles, it was accompanied by induration, erythema without edema,decreased mobility and difficulty to find popliteal and femoral pulse. No coldness or paresthesias. Neurological exam was normal.
Differential diagnosis was undergone with arterial injury, deep vein thrombosis, peripheral nerve injury and compartimetal syndrome.
After high clinical suspicion, a compartment syndrome was considered.
Within the first 24 hours, an urgent fasciotomy was performed under regional anesthesia.
**Discussion:** Despite its low incidence, compartment syndrome exists and it must be present in our differential diagnosis whenever we have a patient undergoing surgery-length lithotomy position. The prognosis is determined by early diagnosis and timely treatment.
If delayed more than 24 hours it may leave permanent nerve damage and loss of muscle function, situation called Volkmann ischemia.
**References:**
1. Bauer EC, Koch N, Janni W, Bender HG, Fleisch MC. Compartment syndrome after gynecologic operations: evidence from case reports and reviews. Eur J Obstet Gynecol Reprod Biol. 2014 Feb;173:7-12
2. Boesgaard-Kjer DH, Boesgaard-Kjer D, Kjer JJ Well-leg compartment syndrome after gynecological laparoscopic surgery. Acta Obstet Gynecol Scand. 2013 May;92(5):598-600.
**Learning points:** Compartment syndrome must have a multidisciplinary approach with the collaboration of all medical staff to prevent patients from suffering it.

## 08AP05-3

### Ultrasound diaphragm contractility evaluation for a steinert patient during anesthesia

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**Background:** Steinert Syndrome patients (SS) are very sensitive to hypnotics, opioids and neuromuscular blocking agents (NMB). Respiratory function monitoring is useful to evaluate myotonic patients. Ultrasound (US) diaphragmatic funcionality is ideally suited for ventilatory trittration and can be performed at the bedside ensuring an optimal respiratory outcome after surgery under general anesthesia.
**Case report:** A 47-year-old woman with SS, scheduled for laparoscopic hysterectomy. Right hemidiaphragm thickness (tdi) was measured using a linear US probe on midaxillary line between 8-10th intercostal spaces previously induction. The percent change between end-expiration and end-inspiration (Δtdi%) was calculated.
After standard monitoring, general anesthesia was induced and laryngeal mask (LM) was placed. The patient underwent laparoscopy with pneumoperitoneum (intraabdominal pressure <10mmHg) with an adequate LM seal. Surgery was completed while 4/4 TOF and 36-37ºC were conserved. Intravenous AINE and TAP block were performed. Respiratory pattern was satisfactory under support pressure (5 cmH2O) beside the Δtdi% was imaged and measured. When the patient was regaining consciousness and responded to simple commands, LM was removed. Respiratory movements were approppiated and Δtdi% confirmed diaphragm contractility ensuring respiratory autonomy. The patient remained stable without requiring ventilatory support for SATO2>95%.
**Discussion:** SS presents contraindication to succinylcholine use and a risk of prolonged neuromuscular blockade with non-depolarizing NMB. General anesthesia using short action drugs, avoiding NMB with a LM and supplemented with US diaphragm contractility tittration, evidences a satisfactory anesthetic technique for SS patients. Despite not using NMB, exhaustive monitoring muscle contractility was justified by the high sensitivity to anesthetic drugs which can develop in respiratory failure.
Therefore, it becomes a helpful tool for perioperative evaluation to determine the optimal assessment in patients with high risk of respiratory muscles weakness after a general anesthesia.
**References:**
Toby N. Anesthesia and myotonic dystrophy type 2. Can J Anesth 2010
DiNino. Diaphragm ultrasound as a predictor of successful extubation from mechanical ventilation. Crit Care 2015.
Matamis D. Sonographic evaluation of the diaphragm in critically ill patients. Intensive Care Med 2013
**Learning points:** US diaphragm evaluation, Myotonic syndrome, Postoperative management

## 08AP05-4

### Paraplegia in a patient with epidural cateter

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**Background:** Paraplegia due to spinal cord infarction is a rare and devastating perioperative event, even rarer in the setting of an epidural technique.1 Some causes are treatable,however an early diagnosis and intervention is required.
**Case report:** Male, 61 years old,ASA III,presented for an elective repair of an abdominal hernia. Hypertension,diabetes mellitus typeII,obesity and past history of rectum cancer with QT-RT. The patient was operated under general anesthesia combined with a lumbar continuous epidural infusion without any noteworthy occurrence. In the postoperative period the epidural infusion was continued with ropivacaine (0,2%) and morfine (0,005%) at 6mL/h. The patient was discharged from the post-anesthesia care unit without any motor deficits. In the next morning the patient was able to walk assisted. Later complained of sudden intense motor weakness in lower limbs. The infusion was stopped and the patient urgently referred to examination by a neurologist who observed the occurrence of an anterior spinal artery syndrome. An MRI was emergently done: there were no findings suggestible of compressive causes, only a signal alteration compatible with ischemia of conus medullaris.
**Discussion:** A case review found only 13cases of spinal cord infarction in 38years.2 The ethiopathogenesis is multifactorial. In this case we accounted several risk factors: cardiovascular, prothrombotic state, post-radiation vasculitis. The continuous infusion of epidural local anesthetics assumes high importance in these circumstances because it can have a contributing role and can also masquerade signs and symptoms leading to a late diagnosis. Given that the patient was able to walk next morning and to the sudden onset of paralysis we can arguably exclude the epidural technique as the principal cause of the neurologic deficits.
**References:**
1. T.M.Cook, D.Counsell, J.A.Wildsmith, 'Major Complications of Central Neuraxial Block: Report on the Third National Audit Project of the Royal College of Anaesthetists', *Br J Anaesth,* 102 (2009), 179-90.
2. I. A.Hobai, E.A.Bittner, and L.Grecu, 'Perioperative Spinal Cord Infarction in Nonaortic Surgery: Report of Three Cases and Review of the Literature', *J Clin Anesth,* 20 (2008), 307-12.
**Learning points:** The rarity of this complication justifies the publication of the case because it draws the attention for the possible occurrence of neurologic impairment in patients undergoing neuraxial techniques while not being directly causative.

## 08AP05-5

### Associating liver partition and portal vein ligation for staged hepatectomy, the anesthesiologist's final touches in this new scenario

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**Background:** Safe removal of extensive tumor load in the liver has been one of the main focuses of research for hepato-biliary surgeons over the past decades. The objective of overcoming the main challenge: avoid postoperative liver failure[1]. In this sense, the portal vein ligation associated to transection for hepatectomy in two stages (ALPPS) has been promising, as it promotes a rapid and effective growth of the remaining liver, allowing surgical resections considered unfeasibles[2]. In the scenario of a recent surgical technique, with higher morbi-mortality rates, and a few well-established anesthetic strategies,

we aim to raise the discussion, from our case, of how the anesthesiologist can add to this context.
**Case report:** MGPSC, 49 years old, ASA P2, with history of cholangiocarcinoma, CHILD A5 and MELD 8, previously submitted to chemotherapy and propose of ALPPS. She was submitted to a general venous and inhalatory anesthesia, monitorization of the cardiac output (CO) with transpulmonary thermodilution (PiCCO®) for goal directed therapy (GDT), transfusion guided by tromboelastography and patients controlled venous analgesia in the two surgical moments. During the interval of eight days between the surgeries, she was observed clinically, tomografically, laboratorially and with the evaluation of the hepatic function with the plasma disappearance rate of indocyanine green (TDP). She presented an expected evaluation between the two surgeries, and also after the second surgery.
**Discussion:** Because it is a recent technique, still without deeper studies, details about the ideal anesthetic technique and the hemodynamic monitoring were not yet well established. In this context, it is worth mentioning the role of indocyanine green monitoring hepatic reserve in the perioperative moment overcoat associated with hepatic volume by computed tomography, as auxiliary goals to surgical decisions and decrease liver failure incidence and related complications perioperatives[3]. Moreover, it is also appropriate to study about the use of CO for GDT and its presumed impact on patients outcome.
**References:**
1. Santibañes E, Alvarez FA. World J Surg 2012; 36:125-128.
2. Schnitzbauer AA, Lang SA, Goessmann H, et al. Ann Surg 2012;255:405-414.
3. Imamura H, Sano K, Sugawara Y, et al. J Hepatobiliary Pancreat Surg 2005;12:16-22.
**Learning points:** Participation of the anesthesia team is substantial to the overcoming of the patient undergoing complexes new surgeries, as ALPPS.

## 08AP05-6

### Ultrasound detection of pneumothorax caused by improper ultrasound-guided central vein puncture

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**Background:** Ultrasound (US)-guided central venous catheterization has become widely used due to the availability of small high-resolution US devices. Since US-guided central venous (CV) catheterization can be performed while confirming the location of the puncture needle and the structure around the vein, there have been many reports on the high level of safety, but complications have been happened by overconfidence of US images. US devices are also used for evaluation of lung diseases.
We report a case of pneumothorax caused by CV port placement that was detected quickly by US.
**Case report:** A 60-year-old woman was scheduled diagnostic laparoscopy and CV port placement under general anesthesia. For CV port placement, the assistant obtained a short axis view of the right subclavian vein with US, and the operator performed puncture using the out-of-plane method. The needle was inserted up to its base without confirmation of the tip. Although the needle tip was also not visualized on the second puncture, an image showing compression of the subclavian vein by the needle was obtained and the guidewire was placed by the penetration method. Then the CV port was implanted by the usual process, and there was no change in ventilation and oxygenation. We performed lung ultrasonography because pneumothorax was suspected due to the puncture procedure. The US image showed a lack of lung sliding and a barcode sign at the right anterior thoracic region, therefore we diagnosed as a pneumothorax. Then we tried to find out a lung point to estimate the severity of the pneumothorax, but no lung point was found in the lateral thoracic region. This US scan indicated a severe pneumothorax, therefore a chest tube was quickly placed.
**Discussion:** When performing US-guided CV catheterization, serious complications can occur without US images of the puncture needle tip. Safe puncture is not possible without a good understanding of the characteristics of US-guided puncture. To visualize the target vein and puncture needle on the US image is important. This can be achieved by correct handling of US probe and puncture needle. It is risky to just focus on the US images.
**Learning points:** Attention must be given to possible complications such as pneumothorax that can occur if US-guided CV puncture is performed improperly. Pneumothorax is easily diagnosed by lung ultrasound, thus US should be used to check for pneumothorax after performing CV catheterization.

## 08AP05-7

### Anesthetic management of corneal transplant in a patient with non-bullous congenital ichthyosiform erythroderma

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**Background:** The ichthyosis comprise a group of congenital disorders characterised by the presence of hyperkeratotic scales on the skin surface. Non-bullous congenital ichthyosiform erythroderma is an infrequent form of presentation, only few cases have been reported. This condition is inherited in an autosomal recessive pattern and the most common cause is inactivating mutations in the transglutaminase-1 gene. Clinical manifestations include scaling of the skin, difficulty maintaining body temperature and in some cases malnutrition and musculoskeletal deformities.
**Case report:** We present the case of a 20-year old patient with non-bullous congenital ichthyosiform erythroderma who underwent corneal transplant under general anaesthesia. The patient presented erythroderma and generalised scaling of the skin, osteoarthritis, scoliosis, glaucoma and lagophthalmos. No difficult airway was anticipated. Intravenous access placement was difficult. Prior to induction of general anaesthesia we placed a 22G intravenous catheter and the patient received standard and neuromuscular monitoring. Secure fixation of the endotracheal tube and iv cannula was performed, additionally proper positioning was revised and a forced-air warming system was used to maintain body temperature. Surgery was uneventful and the patient was extubated in the operating room without incidents.
**Discussion:** Because of scaling, fixation of the intravenous cannula, endotracheal tube and monitoring elements was difficult. Scaling also prevents from maintaining correct body temperature, consequently,temperature monitoring and body warmers were used. The skin in these type of patients is more sensitive to damage, thus, BIS monitoring was not placed but neuromuscular monitoring was used due to surgical requirements. Positioning and transportation was carefully performed considering musculoskeletal deformities. Lastly, venous access can be difficult because of abnormal keratinisation of the skin, which happened in our case.
**Reference:**
Kubota R[1], Miyake N, Nakayama H, Arita H, Hanaoka K. Anesthetic management of a patient with non-bullous congenital ichthyosiform erythroderma. Masui. 2003 Dec;52(12):1332-4.
**Learning points:** Difficult venous access, difficult material fixation and risk of hypothermia are the main issues that should be taken into account. Possibility of a difficult airway must be kept in mind because the progress of the disease may lead to restriction of mouth opening and neck mobility.

## 08AP05-8

### Ultrasonography: an uncommon way to diagnose a pneumothorax

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**Background:** The role of ultrasonography in the anesthesiology daily practice does not stop in the locoregional techniques. Nowadays, this tool has a massive importance, including the intraoperative diagnosis of several clinical entities[1]. The authors describe the clinical case of iatrogenic pneumothorax (PT) that happened during laparoscopic surgery, which, after clinical suspicion, was diagnosed by ultrasonography.
**Case report:** Male, 64 years old, classified as ASA II (obesity and diverticulosis). The patient was submitted to a laparoscopic total gastrectomy due to adenocarcinoma in the lesser curvature of the stomach under combined anesthesia (thoracic epidural and, afterwards, general anesthetic induction), uneventful.
Patient was monitored with standard ASA and BIS. 160 minutes after incision, the patient desaturated progressively (O2 at 100%: 91%), with no vesicular murmur on the left hemifield on pulmonary auscultation. The surgical team pointed out the possibility of iatrogenic stomach laceration, fact not confirmed after instillation of methylene blue.
Thus, we confirmed the correct position of the endotracheal tube by fibroscopy. Clinical suspicion of iatrogenic pneumothorax was strong and we further confirmed it by ultrasonography. A thoracic drain was inserted, uneventful. No significant complications were noted in the postoperative period.

**Discussion:** Pneumothorax is one of the most frequent complications in laparoscopic surgery, with described incidence between 0,01 and 3%. The use of ultrasound on its diagnosis gained significance due to the high portability, specificity (100%) and sensitivity (95%), image quality and generalized access by the anesthetists, which allows a quick diagnosis and subsequent treatment[1]. The presence or absence of typical sonographic signs permit the pneumothorax diagnosis, such as stratosphere sign on M mode, immobility of the pleura with respiratory movements and loss of comet tail sign. In this specific area, the literature states that the PT diagnosis can be done with high level of reliability, regardless the previous experience with ultrasonography.
**Reference:**
1. Terwaki A et al; Ultrasound for the anesthesiologist: present and future; The Scientific World Journal; vol 2013 (2013)
**Learning points:** Due to the above described, the authors aim to reveal and broaden the limits of this technic in anesthesiology daily practice during the whole perioperative period.

## 08AP05-9

### Multiple extradrenal pheochromocytoma associated with severe B haemophilia

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**Background:** Multiple paraganglioma is a rare neuroendocrine tumour that accounts for 0,2-0,6% of the causes of hypertension. Type B haemophilia is a recessive hereditary coagulopathy with a deficit of factor IX. We report one surgical patient who presented multiple paraganglioma associated with severe B haemophilia. This association has never been reported in the medical literature (1).
**Case report:** A 19-year-old patient was referred with a one-year history of paroxysmal hypertension. In the preliminary workup, it was found high levels of 24-hour urinary vanillyl mandilic acid and catecholamine. The complementary test revealed multiple bilateral adrenal mass lesions that suggested malignancy. Adequate hemodynamic stabilization was treated with alpha-receptors blockers, conducted with doxazosin, further beta blockade with labetalol and amlodipine. Hemodynamic monitoring has been carried out by the invasive measurement of blood pressure and measurement of cardiac output with the transpulmonary thermodilution based PiCCO®-system. In addition, the patient had a severe deficiency of factor IX with levels of <1% and absence of an inhibitor to factor IX. Preoperative infusion of recombinant factor IX was initiated to keep the level of factor IX to 120% and to decrease the risk of bleeding during the surgery. Thromboelastometry has been used in assessing the acute perioperative bleeding tendency in order to optimize blood product selection and utilization. ROTEM parameters were measured.
**Discussion:** Multiple paraganglioma requires careful therapy after diagnosis. A complete anaesthetic risk and comorbidity assessment must be performed, including an exhaustive assessment of the coagulation in addition to a hemodynamic management. A multidisciplinary approach was required in this patient to enable the development of the surgery.
**Reference:**
1. Jebasingh K F, et al. Pheochromocytoma and haemophilia: An unusual combination. Singapure Med J. 2009; 50(2): e71-e73
**Learning points:** This case report shows that a hemodynamic approach in a patient with pressure liability secondary to his comorbidity, and a right haemostasis management are mandatory. The coagulation assessment is critical in surgical patients above all in haemostatic disorders. Blood loss can result in severe hemodynamic instability that can lead to worse outcomes.

## 08AP05-10

### Perioperative management of an adult with a complex high-risk congenital heart disease presenting for non-cardiac surgery

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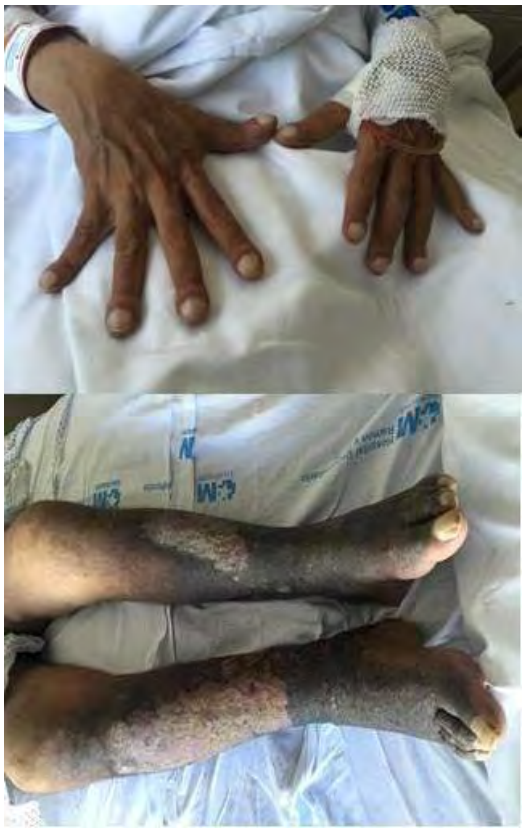
**Background:** Greater survival to adulthood of patients with congenital heart disease (CHD) and lack of comprehensive expertise in their perioperative managements puts them at very high-risk when exposed to non-cardiac surgery.
**Case report:** 43 y.o. ASA IV male scheduled for giant inguinal hernia repair. History of severe cyanotic CHD: single ventricle, severe systolic dysfunction, tricuspid and pulmonary atresia and a bidirectional Glenn surgery performed at birth. Physical status was NYHA IV with central cyanosis, severe finger clubbing (see figure) and baseline SpO2 of 85%. Before induction we placed a FloTrac® monitoring device and administered Protomplex® 500mg/iv. We performed general anaesthesia with a sequential inhalation induction with sevoflurane, fentanyl 2,5mcg/kg and muscle relaxation with rocuronium, maintenance with sevoflurane and ventilated with pressure controlled ventilation. After induction the patient became mildly hypotensive and hemodynamic stability was achieved with phenylephrine infusion (<0,1mcg/kg/min). The surgery continued uneventful and the patient was extubated and stayed in the PACU for 12h without complications.



*[Cyanosis and clubbing]*

**Discussion:** Post Glenn patients are still cyanotic, but the single ventricle is now unloaded, as the systemic return from upper half of the body is diverted directly to the pulmonary circulation. Decrease venous return and cardiac output should be anticipated, and volume and vasoconstrictors should be readily available, neuraxial anaesthesia increases these changes and might not be favourable for these patients. We opted for a sequential inhalation induction due to its hemodynamic stability. Spontaneous ventilation is ideal for these patients, although it wasn't an option in this patient after discussion with the surgeons, tracheal extubation was performed as soon as possible.
**Reference:**
Seal. Pediatric Anesthesia 2011,21:615-622. Gottlieb. Curr Opin Anesthesiol. 2013,26:318-326. Maxwell. Congenit Heart Dis. 2015,10:21-29
**Learning points:** Understanding anatomy and physiology of CHD is essential for optimizing outcomes in these patients. Strict hemodynamic and respiratory monitoring allows us to foresee critical events.

## 08AP05-11

### Interfastial thoracic regional techniques could be assessed using ANI monitor under general anaesthesia and anticipate postoperative pain

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**Background:** Control of intraoperative and postoperative pain is a challenge for anaesthesiologist. Analgesia Nociception Index (ANI) monitor has been proposed as an effective tool to assess the quality level of the analgesia during the intraoperative period and to predict postoperative pain and needs of analgesics in the early postoperative periods. Intraoperative and postoperative success of the different new regional techniques under general anaesthesia could also be assessed using ANI.
**Case report:** We included 9 patients scheduled for bilateral mastectomy (3 with Gender Identity Disorder and 6 with breast cancer or ductal hyperplasia) with no history of chronic pain or metabolic disorders or opioid consumption. The recently described intercostal nerve block BRILMA (anterior and lateral cutaneous branches of the intercostal nerves) was performed bilaterally under general anaesthesia using the ultrasound to locate the 5th-6th intercostal level at the mid-axilary line (L-bupivacaine 0,25% 0,35 ml/kg on each side was administered). TCI-TIVA of propofol (Schnider model) and remifentanil (Minto model with a effect site concentration 2 mcg/ml) were used and the pump was stopped at the end of surgery. ANI monitor was used since induction and levels did not reach any value below 50. No extra needs of opioids were needed in any patient during surgical time. Visual Analogue Scale for pain (0-10) in the first 24 hours in the PACU showed an average of 2,2 (any value was higher than 4). Only 2 patients needed 1 mg extra dose of morphine. None of the patients presented nausea or vomiting.
**Discussion:** The ANI monitor could be an effective tool in assessing the efficacy of regional techniques under general anaesthesia and could allow using lower doses of opioids (remifentanil) during surgery. Furthermore, it could also help to predict the postoperative levels of analgesia and the needs of extra opioids in the PACU when assessing the success of a regional block in the intraoperative context.
**References:**
1. Diéguez García P, et al. Rev Esp Anestesiol Reanim. 2013;60:365-70.
2. Migeon A et al. Paediatr Anaesth. 2013;23:1160-5
3. Boselli E et al. Br J Anaesth. 2014;112:715-21.
**Learning points:** New interfastial thoracic techniques could be assessed using the ANI monitor under general anaesthesia.ANI values could also anticipate postoperative levels of pain and the need of extra analgesics when used during surgery. We need new clinical trials to confirm our data.

## 08AP06-1

### Improving Patient Flow in Critical Care: Development of a Post Anaesthetic Care Unit with "Simultaneous Virtual Ward Admission

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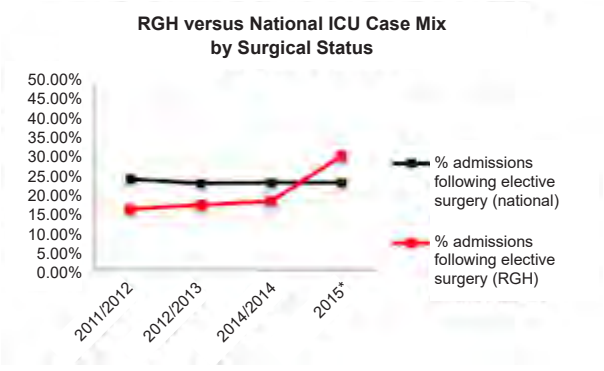
**Background and Goal of Study**: Critical care capacity in Wales is amongst the lowest in Western Europe. This problem is compounded by a significant loss of critical care bed days due to delayed discharges (7.5% of total critical care bed days in 2012/13). Consequently, critical care occupancy rates are consistently >80% leading to significant numbers of high-risk operations being cancelled.
All patients admitted to the PACU at the Royal Gwent Hospital (RGH) Newport are simultaneously admitted to a ward. As such they "virtually" occupy a ward bed, ensuring timely discharge from critical care. We aimed to determine if the introduction of a PACU with this novel admission process, has reduced cancellations of high-risk surgery.
**Materials and methods:** We conducted a retrospective analysis of patients for whom a critical care bed had been booked electively at the RGH, Newport. All cases were examined to determine if the procedure had been cancelled and if so the reason for cancellation. Data was examined for the period April-October for 2012-2014. This was then compared to the same period in 2015 when a PACU was operational.
Additional ICU case mix analysis was conducted using ICNARC national audit data.
**Results and discussion:** The demand for critical care to facilitate high-risk surgery increased year on year with 138% more critical care beds booked in 2015 than in 2012. Despite this, the introduction of the PACU markedly reduced the percentage of these procedures cancelled due to a lack of critical care beds, from 28% (2014) to 1% (2015).
The proportion of total admissions constituted by patients admitted after elective surgery also increased. As demonstrated in Fig 2 the RGH ICU had a consistently lower than average proportion from 2012-2014 before exceeding the national average in 2015.




*[Fig 2]*
* April-June

**Conclusion:** This study demonstrates that the introduction of a PACU with simultaneous virtual ward admission can markedly reduce cancellations of high-risk surgery and significantly impact on the case mix of an ICU. Further work should include cost effectiveness analysis.
**Reference:**
Welsh Government (2013), Together for Health-A Delivery Plan for the Critically Ill

## 08AP06-2

### Predicting Morbidity and mortality after esophagectomy using P-POSSUM

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**Background and Goal of Study:** Morbimortality after esophagectomy remains high. Predicting risk is important to improve management of the perioperative period. Portsmouth-Physiological and Operative Severity Score for the enUmeration of Mortality and Morbidity (P-POSSUM) has been used to predict morbimortality after surgery.
Our aim was to measure outcomes after esophagectomy and compare it with P-POSSUM prediction.
**Material and methods:** Retrospective, observational study including patients submitted to esofagectomy at our hospital between 2006 and 2013. Patients' demographics and perioperative data were collected. Descriptive analysis was performed and the student t, Mann-Whitney, Chi-square or Fischer's exact tests were used for comparisons. Univariate and multivariate logistic regression were done with calculation of an Odds Ratio (OR). Areas under the Receiver Operating Curve (AUROC) were analyzed to test the prediction accuracy.
**Results:** We included 80 patients, 85% were male. Age was 60 (51-70) years. Smoking (55%), alcohol abuse (40%) and arterial hypertension (29%) were the main comorbidities. Preoperative radio/chemotherapy was done in 60% of cases. Surgery lasted 8.5 (7.5-10.0) hours, 24% required vasopressors and 50% were transfused. Post-operative hospital mortality was 10% and 85% of patients had at least 1 complication (68% respiratory, 42% cardiovascular, 26% infectious, 6% renal). On univariate analysis, higher intraoperative (OR 0.90, p=0.005) and postoperative arterial pressure (OR 0.95, p=0.032) and higher pre-operative serum albumin (OR 0.63, p=0.002) were protective factors for mortality. On multivariate analysis a higher pre-operative serum albumin (OR 0.64, p=0.002) was found to be a protective factor. P-POSSUM predicted the occurrence of morbidity in 92.7% and mortality in 11.5% of cases. P-POSSUM had an AUROC of 0.814 for mortality prediction and the Simplified Acute Physiology Score II (SAPS) had an AUROC of 0.627. Using

the pre-operative serum albumin for mortality prediction we obtain an AUROC of 0.96. P-POSSUM had an AUROC of 0.816 for morbidity.
**Conclusions:** Morbimortality prediction by P-POSSUM was good (AUROC >0.8) and it should be used to guide perioperative management. Pre-operative serum albumin is not included in the analyzed scores but may improve its prediction in the near future.

## 08AP06-3

### Obstructive sleep apnea and clinical predictors: the anesthesiologist role

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**Background and Goal of Study:** Obstructive sleep apnea (OSA) is a largely underdiagnosed,common condition, important to diagnose because their implications for perioperative management. Clinical evaluation is essential to screen OSA. Suspected diagnosis can determine the best actitude before a scheduled surgery.
Anesthesist must examine patient appearance and assort clinical scales (Mallampati) to classify them before anesthesia. It is a noninvasive method performed routinely in all preoperative visits that define oropharyngeal morphology that is also employed to suspect OSA. Our purpose in this study is to identify clinical predictors of OSA shared with usual difficult airway evaluation mehtods in surgical patients.
**Materials and methods:** After research ethics board approval, snoring patients subjected to polysomnography study (PSG) were studied retospectively for 6 months collecting anthropometric data, nasal ventilation and Mallampati grade. The PSG identified OSA patients were further classified based on apnoea-hypopnoea index (AHI). Patients were assorted into OSA and NO OSA, Mallampati 1-2 and 3-4 grade, nasal obstruction or not. T student and Chi-square was used to compare groups and a logistic regression test.
**Results and discussion:** 137 patients, 90 men and 47 women, aged 56 ± 17, BMI 30 ± 7, neck perimeter 42cm ± 4, IAH 30 ± 21. Comparing OSA and NO OSA: age (58 ± 14 vs 50 ± 22, $p<0.05$), IAH (39 ± 19 vs 9 ± 4, $p<0.001$), BMI (32 ± 6 vs 25 ± 4, $p<0.001$) neck perimeter (44 ± 4 vs 39 ± 3, $p<0.001$), gender (74% men vs 45% women, $p<0.001$), nasal obstruction (70% vs 40%, $p<0.001$), Mallampati 3-4 (70% vs 47%, $p<0.01$) and Mallampati 3-4 with nasal obstruction (54% vs 35%, $p<0.001$). In the multivariate analysis, predictors of OSA were Mallampati 3-4 (OR: 2.5; 95% CI: 0.9-6.2), BMI>30 (OR: 3.2; 95% CI: 1-9.7) and neck perimeter >42cm (OR: 18.8; 95% CI: 3.9-89.6), $p<0.001$.
**Conclusion(s):** Obese and gross neck patients, Mallampati 3-4 grade with nasal obstruction, have high chances of developing OSA. Anesthesiologists are in a great opportunity during preanesthetic evaluation to screen OSA patients. Patients with these characteristics should be referred to PSG for diagnosis confirmation. However the only suspicion of OSA may determine perioperative management and patients should be planned as OSA. Moreover, serious OSA should be considered to PNG and CPAP implemention might benefit to optimize clinical condition to face perioperative process.

## 08AP06-4

### The effect of metabolic syndrome on peri- and post-operative outcomes of patients undergoing elective abdominal surgery with laparotomy

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**Background and Goal of Study:** Metabolic syndrome (MetS) comprises a group of risk factors that include high blood pressure, atherogenic dyslipidaemia, elevated fasting blood glucose, and central obesity. MetS is frequent (25%) in the general population and has been associated with several comorbidities[1]. The aim of this study is to access the impact of MetS on peri- and post-operative outcomes of patients undergoing elective abdominal surgery with laparotomy.
**Materials and methods:** This is a prospective observational study (Clinical Trials.gov: NCT02447523) involving 105 consecutive patients (68 male, mean age 66.32 ±12.43 years, ASA I-III) undergoing elective abdominal surgery with laparotomy with expected procedure duration >1 hour. The patients were divided into two groups based on the established diagnosis of MetS. Clinical characteristics, intra- and post-operative data, laboratory measurements and peri- and post-operative complications were recorded
**Results and discussion:** 59 patients (33 male) met the diagnostic criteria for MetS, while 46 (35 male) did not. Patients with MetS were older, had worse ASA and New York Heart Association (NYHA) Functional Classification scores and presented with lower GFR-EPI (glomerular filtration rate using the Chronic Kidney Disease Epidemiology Collaboration formula) values compared with non-MetS patients ($P<0.05$ for all comparisons). Coronary artery disease and peripheral vascular disease were more prevalent in MetS patients ($P<0.05$). MetS was associated with 2.47 (95% CI 1.10-5.54, $P=0.027$) higher odds of having postoperative respiratory complications and with 3.58 (95% CI 1.09-11.66, $P=0.027$) higher odds of having wound healing complications. Operative data (duration of surgery and anaesthesia, volume of crystalloids and colloids given) were similar among groups.
**Conclusion(s):** Patients undergoing elective abdominal surgery with laparotomy, who fulfill the diagnostic criteria for MetS, appear to have a higher risk for postoperative respiratory and wound healing complications. Consequently, these patients present a diagnostic challenge and are candidates for a more meticulous peri-operative monitoring.
**Reference:**
1. Tzimas P, Petrou A, Laou E, et al. Br J Anaesth. 2015 Aug;115(2):194-202.

## 08AP06-5

### 90-days mortality in relation to fast-track total hip and knee arthroplasty

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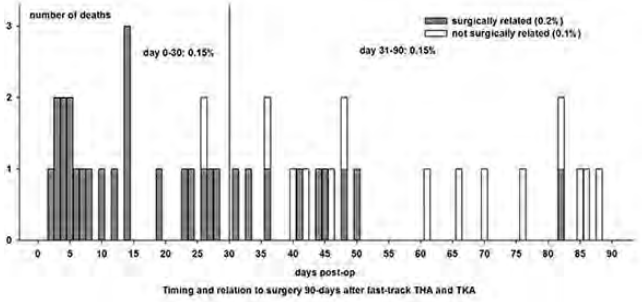
**Background and Goal of Study:** Early mortality (30 to 90 days) is a common outcome in surgical studies including in total hip (THA) and knee arthroplasty (TKA). However, few studies consider whether mortality is a result of direct anesthetic/surgical complications, surgically induced organ dysfunction or unrelated to surgery. Also, most studies rely on large databases and diagnostic coding, but with no considerations on perioperative care, thus limiting potential for improvement. We present a detailed analysis on timing and events leading to mortality within 90 days after fast-track THA and TKA, including evaluation on relation to surgery per se.
**Materials and methods:** Observational cohort study in 13775 THA and TKA, similar fast-track protocols and discharge to own home. Complete 90-days follow-up through a national registry and review of the complete medical records from index admission and readmissions. In case of death outside hospital the patients general practitioner was contacted and the death certificate was reviewed. Evaluation of relation to surgery was done by both authors. Cases with inconclusive information, but no apparent organ dysfunction at discharge were considered surgically related if occurring ≤30 days postoperatively.
**Results and discussion:** 90-days overall mortality was 0.3%, of which 0.2% were surgically related. (Fig 1)




*[Figure 1]*

The 30 deaths related to surgery occurred on median day 16.5 (6-34). The fraction of surgery related deaths fell from 95% at day 30 to 68% at day 90, only with one case after day 50. The 14 deaths unrelated to surgery occurred median day 64 (42-83), contributing 59% of deaths between day 31 and 90. When considering the initial event leading to death, gastrointestinal and pulmonary complications each accounted for 20% of surgically related deaths,

while cerebral stroke, pulmonary embolism and cardiac complications accounted for 17, 13 and 10%, respectively. Only 10% were due to direct surgical complications. Cancer was the most common cause of deaths not related to surgery.
**Conclusion:** 90-days mortality is ≈ 0.3% after fast-track THA/TKA, and 1/3 of deaths may not be related to surgery or surgically induced organ dysfunction.

## 08AP06-6

### The anesthetic role in implementing a fast-track oncogynecologist surgery protocol. Preliminary results from a 3-year randomized clinical trial

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**Background and Goal of Study:** Fast-track surgery programs are based on a multimodal approach to patients undergoing major abdominal surgery; the main objective is to improve the postoperative period based on a quick oral tolerance and stimulation of early mobilization; it's possible due to a specific anaesthetic protocol in which multimodal analgesia has a main role. We present data of preliminary stage of a planned 3-year study, 100 patients randomised clinical trial comparing fast-track protocol with conventional management. Main objective: compare the average stay between groups. Secondary objectives: determine cost per patient, postoperative morbidity and the applicability of a fast-track program in the management of advanced ovarian cancer in a tertiary hospital in our midst.
**Materials and methods:** During 14 months, 24 women undergoing oncogynecologic major surgery were randomized to either fast-track protocol (fast-track group) or conventional management (conventional group). Fast-track group received preoperatively: no colonic preparation, no anxiolytics; carbohydrate solution 3h before surgery. No nasogastric tube or drains. Multimodal analgesia and guided-fluid therapy by monitoring noninvasively cardiac output. Combined general-epidural anaesthesia. Early discharge from recovery room was provided in postoperative period, based on a strict pain control avoiding opiate drugs. Combined intravenous-peridural analgesia with elastomeric ropivacaine 0.2% infusion bomb was performed to facilitate an early mobilization and respiratory rehabilitation. Conventional group received colonic preparation, anxiolytics, 8 hours-fasting. General balanced anaesthesia with nasogastric tube and drains. Postoperative opiates.
**Results and discussion:** Data analysed for 24 patients (12 fast-track group, 12 conventional group) with advanced ovarian cancer. Mean age: 61 years, mean weight: 67 kg. The average stay fell 33,3% in the fast-track group (8 days) regarding to conventional group (12 days). 72 hours post-surgery, 91% of fast-track group patients were initiated oral tolerance and mobilization. Reported postoperative complications: 1 suture dehiscence, 3 surgical wound infections, 1 paralytic ileum, 1 suboclussion. None of the patients died in the 28 days following the surgery.
**Conclusion:** Through a fast-track protocol the average hospital stay decreases, as well as the postoperative period recovery in patients subjected to major advanced oncogynecologist surgery.

## 08AP06-7

### Impact of unintentional postoperative hypothermia on patient-centred outcomes after general anaesthesia

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**Background and Goal of Study:** Unintentional postoperative hypothermia is a frequent occurrence that can lead to several complications, adversely affecting the patient's outcome. This study aims to assess the incidence and impact of hypothermia on patient-centred outcomes after elective surgery.
**Materials and methods:** After approval by the institutional ethics committee, an observational, prospective study was performed in patients scheduled for elective surgery under general anaesthesia. Were studied 208 patients admitted to the Post Anaesthetic Care Unit (PACU) after plastic, gynaecologic, urologic and general surgery. Exclusion criteria were: age<18 years and inability to give informed consent or to speak Portuguese language fluently. Patients' demographics and perioperative characteristics were evaluated. Hypothermia was defined as an auricular temperature<35ºC at PACU admission. Quality of recovery (QoR) 24h after surgery (D1) was evaluated by the Quality of Recovery 15 (QoR-15) score. The Postoperative Quality Recovery Scale (PQRS) Portuguese version was used at baseline (D0) and after surgery at minute 15 (T15), 40 (T40) and days 1 (D1) and 3 (D3) evaluating recovery in 5 domains. The 12-itens WHODAS questionnaire was used to measure Disability at D0. The Mann-Whitney test, Chi-square or Fisher's exact test were used for comparisons.
**Results and discussion:** Hypothermia was present in 39 (20%) of the 192 patients included. Patients with hypothermia were older (61 vs. 53 median years, p=0.037) and had a median low Body Mass Index (25 vs. 27, p=0.044). No differences were found between groups concerning duration of anaesthesia and length of PACU stay. The median scores for total QoR-15 and for every QoR-15 item were similar. Complete recovery in the emotive domain (anxiety and depression) of PQRS was significantly more frequent in hypothermic patients at D1 (68% vs. 43%, p=0.005) and D3 (67% vs. 40%, p=0.005). Complete recovery of activities of daily living was less frequent in hypothermic patients at D1 (30% vs. 48%, p=0.048). Recovery of cognitive domain was worst for hypothermic patients at T40 (0% vs. 22%, p=0.036). Hypothermic patients were not more frequently considered disable by WHODAS at D0.
**Conclusion(s):** PQRS was able to denote important patient-centred differences in outcome after surgery in patients with hypothermia while QoR-15 was not able to show differences. Patients with hypothermia were older and leaner but were not more disable.

## 08AP06-8

### Ischemia detected by continuous postoperative 12-lead electrocardiographic monitoring in high-risk vascular surgery patients

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**Background and Goal of Study:** Elderly surgical patients with comorbidities are at a major risk for perioperative cardiac complications. [1] We investigated continuous wireless electrocardiographic Holter monitoring (cECG) in a postoperative setting to determine (1) the degree of silent cardiac ischemia (SI) and (2) the sensitivity of different lead combinations in detection of ischemia.
**Materials and methods:** cECG recordings of 51 patients aged 65 years or older having undergone peripheral arterial surgery were analysed. cECG monitoring was started after surgery and continued for 72 hours, or until discharge. The impact of posture changes on ischemia detection was evaluated with a 3-axis accelerometer. A standard 12-lead ECG, a measurement of high-sensitive troponin T (TnT), and an enquiry of ischemic symptoms were obtained preoperatively, and on the 1st, 2nd and 3rd postoperative day. The primary outcomes were perioperative myocardial infarction (PMI) and postoperative ischemia load (IL)/patient. We expressed the IL as an integral of ischemic ST-segment deviation and time. $\chi^2$- test was used to compare the differences in detected ischemic events between the lead combinations.
**Results and discussion:** During 3262.7 patient-hours of monitoring, 17 patients (33.3%) had 608 transient ischemic events, all denoted by ST-segment depression (Table 1). Of 17 with ischemia, 5 patients suffered PMI.

| | All patients N=17 | PMI N=5 | No PMI N=12 |
|---|---|---|---|
| Longest ischemia duration (min) | 4.8 [2.8-36.9] | 6.3 [2.0-51.3] | 4.6 [2.8-31.1] |
| Cumulative ischemia duration (min) | 33.0 [7.4-226.2] | 40.5 [3.9-535.7] | 29.1 [10.4-125.7] |
| Ischemia load (μV*min) | 580.3 [104.3-4741.0] | 609.7 [49.7-10834.6] | 518.7 [132.6-1921.3] |
| Preoperative TnT (ng $L^{-1}$) | 22 [10-34] | 30 [13-253] | 21 [10-32] |
| Highest TnT (ng $L^{-1}$) | 37 [19-124] | 175 [36-487] | 31 [15-41] |

*[Table 1. Postoperative ischemia characteristics]*

Ischemia was detected best with the axial leads and V4+V5 (97.2 %) (I), followed by the axial leads and V4 (92.0 %) (II), or V5 (63.3 %) (III) ($p<0.001$ for I vs. II, $p<0.001$ for 1 vs. III and $p<0.001$ for II vs. III). Ischemic changes occurred most frequently during hours 24 to 60 of monitoring. Ischemia was asymptomatic in 82 % of the cases.

**Conclusion:** Postoperative silent cardiac ischemia is common in high-risk surgery patients, and may develop into PMI. A possibility for immediate ischemia diagnosis and treatment would further enhance the value of the surveillance.
**Reference:**
1. Devereaux PJ, Sessler DI. Cardiac Complications in Patients Undergoing Major Noncardiac Surgery. *N Engl J Med* 2015; **373**: 2258-69.

## 08AP06-9

### Perioperative hyperoxia and long term mortality under colorectal surgery

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**Background and Goal of Study:** Perioperative hyperoxia (FiO2>80%) appears to reduce the incidence of surgical site infection in colorectal surgery (CRS) (1). Despite of this benefit, Meyhoff et al. observed an increased long-term mortality in patients receiving hyperoxia during CRS (2). This is a controversial topic, and the goal of this study was to assess long term mortality in our patients submitted to CRS according to the FiO2 received, hyperoxia (FiO2 80%) or standard (FiO2 <50%).
**Materials and methods:** A retrospective cohort study to assess survival was performed with telephone survey in patients who underwent elective colorectal surgery from October 2011 to December 2013. Follow up date to assess survival status was January 2015. Demographic and surgical variables and cancer staging were analyzed. The main outcome was the mortality in follow up period. Survival in two groups, hyperoxia vs standard, was analyzed using Kaplan-Meier statistics.
**Results and discussion:** A total of 223 patients were operated in the analyzed period, 129 receiving <50% perioperative oxygen and 94 receiving 80%. Mean duration of follow-up from surgery was 2.2 (1.1 - 3.3) yr. No significant differences between groups were observed for cancer staging, ASA status, demographic and surgical variables. Mortality rate at the end of follow-up was 14% in hyperoxia group versus 19% in standard group (p=0.6). Kaplan-Meier survival curve did not show significant differences between both groups.
**Conclusion(s):** In our patients scheduled for elective CRS, mortality was similar in spite of the FiO2 received. These findings suggest that hyperoxia could be used until more evidence is available.
**References:**
1. Hovaguimian F et al. Anesthesiology 2013;119:303-16
2. Meyhoff CS et al. Anesth Analg. 2012;115(4):849-54.

## 08AP06-10

### Postoperative adverse outcomes in patients with low income - a nationwide, population-based retrospective cohort study

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**Background:** Socioeconomic inequality might affect the quality and outcomes of health care. A comprehensive, population-based investigation of adverse surgical outcomes among social-deprived patients receiving various types of surgery is still lacking. The aim of this study is to determine the major postoperative complications and mortality rates among surgical patients with low income in Taiwan National Health Insurance Program, a healthcare system with universal coverage.
**Material and methods:** Using the reimbursement claims, 2004-2010, from Taiwan National Health Insurance Research Database, we conducted a nationwide, retrospective cohort study in 73,550 surgical patients with low income and 73,550 controls under the propensity score pair-matched method in sex, age, types of surgery/anesthesia, and major medical co-morbidities. The adjusted odds ratios (ORs) and 95% confidence intervals (CIs) of major postoperative complication and 30-day mortality were analyzed with multivariate logistic regression.
**Results and discussion:** Surgical patients with low income had significantly higher risks of postoperative acute renal failure, deep wound infection, pneumonia, postoperative bleeding, septicemia, stroke, overall major complications (OR 1·64; 95% CI 1·59-1·70), and 30-day postoperative mortality (OR 1·41; 95% CI 1·25-1·59). Comparing with controls, surgical patients with low income encountered increased length of hospital stay, higher incidence of admission to the intensive unit, and higher medical expenditures. Among different types of surgery, patients with low income showed higher 30-day postoperative mortality rates in surgeries of integumentary, musculoskeletal and gastro-intestinal systems. Significant discrepancy in postoperative mortality was noted for patients with low income in hospital in rural areas with limited resources.
**Conclusions:** Socioeconomic deprived patients showed significantly higher postoperative major complication and mortality rates, even under a health insurance program with universal coverage. Our findings call special attention and urgency revising the protocol of postoperative care for this specific population.

## 08AP06-11

### Utility of non-invasive cardiac output measurements during cardiopulmonary exercise testing in pre-operative risk assessment

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**Background and Goal of Study:** Cardio-pulmonary exercise Testing (CPET) is a well-validated method of assessing cardiorespiratory performance and can help identify high risk patients under consideration for surgery. The ultrasonic cardiac output monitor (USCOM) provides non-invasive haemodynamic measurements, including stroke volume (SV) and an estimation of inotropy that could help in pre-operative risk profiling and haemodynamic optimisation peri-operatively. Inotropy (or myocardial contractility) is estimated from the potential and kinetic energy delivered by the left ventricle. We assessed baseline and change (Δ) in SV and inotropy pre- and post-CPET (bike ergometer), in high-risk pre-operative patients and compared these results with CPET markers obtained.
**Materials and methods:** After ethical approval, 35 patients, under consideration for major non-cardiac surgery gave consent and were prospectively recruited to this observational study. USCOM measurements were obtained immediately pre- and post-CPET in the upright position.
**Results and discussion:** Mean age was 74(±8), (14 female, 21 male) pre-CPET values (mean±SD) were: SV 49 (±15) ml, HR 77.9 (±12.6) beats per minute, (CI 2(±0.7) litre min m-2, mean arterial pressure (MAP) 106(±18) mmHg, Inotropy 1.1(±0.4) W m-2. Post-CPET mean percentage Δ in SV was +12.2%, CI +57% and HR +43%. MAP decreased by an average of 6%. Mean O2 consumption at anaerobic threshold (AT) was 11.5(±2) ml/kg/min. At an Inotropy cut-off of <0.95 W m-2 to predict O2 consumption at AT <11 ml/kg/min or failure to reach AT, sensitivity was 43% (95% CI 24-58), specificity 95% (74-100) positive predictive value 86% (42-99) and negative predictive value 71% (51-86). Of the six patients considered to have an abnormal oxygen pulse gradient, five did not increase SV as measured by USCOM.
**Conclusion(s):** In a cohort of high-risk individuals, cardiovascular response of an increase in cardiac output is predominantly reflective of an increase in HR rather than SV. A low baseline Inotropy value using the non-invasive USCOM was a specific but not sensitive predictor of a mean O2 consumption AT <11 ml/kg/min.
**Reference:**
Smith BE, Madigan VM. Non-invasive method for rapid bedside estimation of inotropy: theory and preliminary clinical validation. Br. J. Anaesth. (2013) 111 (4):580-588.

## 08AP06-12

### Causes of readmission within 30 days of surgery in a tertiary teaching hospital in the UK

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**Background:** Readmission within 30 days following surgery may be seen as a form of treatment failure. The readmission and subsequent patient care provided by the Acute Care Trust does not attract any further tariff. Readmissions are currently costing the NHS approximately £1.6 billion per year. Unplanned readmissions increase the risk of acquiring healthcare-associated infections, which can contribute to a further deterioration in patient health status. Reducing readmissions is therefore a priority to improve healthcare delivery and payment reform efforts.
We examined the 30 day readmission rates within different surgical specialties. Our primary aim was to ascertain the percentage of unplanned readmissions attributable to inadequate pain relief. Our secondary aim was to examine communication between the hospital and General Practitioner (GP).
**Methods:** We prospectively collected data over a 2 month period in August and September 2015 for all readmissions within 30 days following surgery. Readmissions that had pain as the primary or secondary cause were analyzed further to identify if pain was secondary to inadequate pain relief or due to an underlying medical or surgical condition.
**Results:** 202 surgical patients were readmitted within 30 days following discharge. Readmissions according to surgical speciality were: General surgery (Upper GI, Colorectal, General) 96 (47.52%), Gynecological 6 (2.97%), Neurosurgery 19 (9.40%), Spinal surgery 15 (7.42%), Trauma/orthopedics 29 (14.35%), Plastic 12 (5.94%), Max fax/dental 7 (3.46%), Ophthalmology 17 (8.41%).
The maximum number of readmissions occurred within the first 10 days following discharge (88 out of 202 patients). Wound infection was the most common reason(26;12.8%) followed by pain as their presenting complaint (20;9.9%). Other primary causes of readmissions were cardiac/CNS event (12;5.9%), Chest/urine infection (12; 5.9%), Haematoma (8; 3.9%), Electrolyte disturbance (7; 3.4%).
**Conclusion:** Readmission due to inadequate pain relief may be preventable. Better discharge instructions, patient education and communication with GP's may reduce readmission rates.Rapid access pain clinics may offer an alternative solution to an inpatient admission where a patient's pain only requires medication review and optimization of analgesia regimen. This would have a huge cost saving and resource management implication.

## 08AP07-1

### Postoperative anaemia and acute kidney injury: a retrospective study in major orthopedic surgery

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**Background and Goal of Study:** Acute kidney injury (AKI) is commonly seen in the perioperative period and is associated with high morbimortality. It has been correlated with perioperative anaemia possibly due to less oxygen transport capacity. The aim of this study was to examine the association between postoperative anaemia and AKI in major orthopedic surgery.
**Materials and methods:** Medical records from patients submitted to elective orthopedic surgery from May to December 2012 were retrospectively reviewed, using a database from a previous study, with Local Ethics Committee approval. Exclusion criteria: minor surgery, chronic kidney disease (CKD) under haemodialysis, serum creatinine (SCr) > 1.6 mg/dL for men and > 1.4 mg/dL for women (without CKD), intraoperative mean arterial pressure (MAP) <55 mmHg and incomplete records. Patient's characteristics, comorbidities, albumin [Alb] and perioperative data were collected. AKI was defined as an increment of SCr baseline of ≥ 0.3 mg/dL or ≥ 50% within 48h (*AKI Network*). Anaemia was considered for haemoglobin (Hb) levels <10.0 g/dl. Descriptive and statistical analysis was performed using SPSS® 21.0 ($\chi^2$, Fisher Exact and Mann-Whitney U tests) with 95% confidence interval. A simple binary logistic regression was performed to identify independent risk factors for AKI.
**Results and discussion:** 196 from 307 were excluded and 111 were included (Anaemia Group [An]= 46; Non-anaemia Group [NAn]= 65). Hb levels 48h after surgery were 9.04 ± 0.83 and 12.06 ± 1.49 g/dL in An and NAn, respectively. Groups also differed on age (An: 65.57 ± 16,28 vs NAn: 57.69 ± 17,82, $p$= 0.019), previous CKD (An: 10.9% vs NAn: 0%, $p$= 0.011) and Alb (An: 3.03 ± 0.50 vs NAn: 3.41 ± 0.46, $p$= <0.001). The mean SCr levels before surgery were 0.87 ± 0.38 and 0.85 ± 0.19 mg/dL in the An and NAn, respectively. 5.4% developed AKI. The AKI incidence was higher in the anemia group (An: 8.7% vs NAn: 3.1%), but without statistical significance ($p$= 0.23). Univariate analysis identified age (OR 1.11, 95% CI 1.00 to 1.23, $p$= 0.04) as an independent predictor of AKI.
**Conclusions:** A statistically significant association between postoperative anaemia and AKI was not established, despite the higher incidence in the anaemia group. Increasing age was independently associated with an increased likelihood of exhibiting AKI. It would be necessary to develop a large and controlled prospective study in order to clarify this tendencies.

## 08AP07-2

### Poor quality of recovery: implications in postoperative health status measured by post-operative quality recovery scale

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**Background and Goal of Study:** Quality of recovery after anaesthesia is an increasingly important measure of postoperative health status of patients. This study aims to determine the incidence of Poor Quality of Recovery (PQR) according to QOR-15 evaluation and determine its implication in postoperative health status measured by Post-operative Quality Recovery Scale (PQRS).
**Materials and methods:** After approval by the institutional ethics committee, an observational, prospective study was performed in consecutive patients undergoing non-cardiac, non-obstetric and non-neurological elective surgery under general anaesthesia admitted at PACU. Exclusion criteria: age <18 years old and inability to give informed consent. Patients completed the QoR-15 score on the day before surgery (T0) and repeated it 24 hours after surgery (T1). PQR was defined as a QoR-15 score lower than the mean QoR-15 score at T1 minus 1 standard deviation. Patients were also assessed using the (PQRS) before surgery, at 15 and 40 min, 1 and 3 days, and 3 months after surgery, evaluating recovery in physiological, nociceptive, emotive, activities of daily living and cognition domains. The Mann-Whitney test, Chi-square or Fisher's exact test were used for comparisons.
**Results and discussion:** One-hundred eighty-two patients were enrolled for this study. Median T1 QoR-15 score was 121 (107-136). Thirty one patients (17%) were identified as having PQR. There were no differences in age, gender, BMI, ASA status, education, type and duration of anaesthesia. Patients with PQR stayed longer in the PACU (145 vs. 120 min, p=0.037) and had longer hospital stay (7 vs. 4 days, p=0.002). These patients had lower QoR-15 score at T0 (128 vs. 140, p=0.001) and at T1 (81 vs. 127, p<0.001), having lower scores in all QoR-15 items. Incomplete recovery at PQRS was more frequent in patients with PQR, namely at 24h in physiological domain (58% vs. 39%, p=0.046) and in activities of daily living (47% vs. 10%, p<0.001). At 72h there was more frequently incomplete recovery in cognitive domain (34% vs. 12%, p=0.021) among PQR patients. At 3 months after surgery, they had incomplete recovery more frequently in the emotive domain (51% vs. 23%, p=0.015).
**Conclusion(s):** PQR is associated with longer hospital stay. These patients not only had lower QoR-15 scores before and 24h after surgery but also had incomplete recovery at 24h, 72h and 3 months after surgery accordingly to PQRS.

## 08AP07-3

### Evaluation of recovery after anaesthesia with Postoperative Quality of Recovery Scale

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**Background and Goal of Study:** Postoperative recovery is complete when function is restored and adverse symptoms have resolved. It is a multifactorial process that extends beyond hospital discharge. We aimed to evaluate the relation between early and late recovery using the Postoperative Quality of Recovery Scale (PQRS).
**Material and methods:** After approval by the institutional ethics committee, an observational prospective study was conducted. Were studied 208 patients admitted to the Post Anaesthetic Care Unit after plastic, gynaecologic,

urologic and general surgery. Exclusion criteria: age <18 years old and inability to give informed consent. PQRS Portuguese version was applied before (T0) and after surgery at minute 15 (T15) and 40 (T40), at day 1 (D1) and 3 (D3) and 3 months (3M) evaluating recovery in five domains: physiological (PD), nociceptive (ND), emotive (ED), cognition (CD) and activities of daily living (AD). Recovery was defined as return to baseline values or better for all questions within each domain. Poor quality of recovery (PQR) was defined as recovery in less than 2 domains at D1. Descriptive analysis was carried and the Mann-Whitney, Chi-square or Fisher's exact test were used for comparisons.
**Results and discussion:** At D1, 182 patients were evaluated with the PQRS. 13.2% patients had PQR. Patients with PQR stayed longer in hospital (p=0.049). There were no differences in age, gender, BMI, ASA physical status and duration of anaesthesia. For PD domain rate of recovery was similar in both groups at T15 (14% vs 9%, p=0.44) and T40 (14% vs 20%, p=0.77) but at D1 patients with PQR recovered less frequently (21% vs 60%, p<0.001). Recovery at ND was worse in patients with PQR since early recovery (T15) (68% vs 91%, p=0.003) to late recovery (3M) (50% vs 88%, p<0.001). Patients with PQR recovered less frequently in ED at all evaluations times: T15 (16% vs 48%, p=0.012), T40 (5% vs 44%, p=0.001), D1 (0% vs 57%, p<0.001), D3 (19% vs 50%, p=0.018) and 3M (19% vs 50%, p=0.031). Recovery of CD was worst for PQR patients only at D1 (0% vs 27.9%, p <0.001). Also at D1 patients with PQR had worst recovery in AD (0 vs. 46%, p<0.001), without differences in latter evaluations.
**Conclusion(s):** The rate of recovery in nociceptive and emotional domains was poor at all time frames for patients with PQR. At 24 hours evaluations PQR patients had worst rate of recovery at all domains of PQRS.

## 08AP07-4

### Incidence and risk factors associated with postoperative delirium

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**Background and Goal of Study:** Postoperative delirium (POD) is characterized by an acute change in cognitive function after general anesthesia and its prevalence can range from 5 to 51%[1]. In this study, we assessed the incidence, risk factors and outcome of POD.
**Materials and methods:** A prospective study in adult patients, submitted to elective surgery, during August 2015. Patients were assessed for delirium signs using 4AT scale at the transfer to OR, admission and discharge of PACU, and 24h after surgery. Positive 4AT assessments were classified as hypoactive or hyperactive delirium through RASS score. Data related to preoperative (gender, age, comorbidities and ASA classification), intra-operative (vital signs, duration and administrated drugs) and postoperative factors (vital signs, length of stay, drugs, modified Aldrete scores and qualitative pain score during PACU stay; vital signs and pain assessment 24h later) were prospectively analyzed.
For statistical analysis were used $X^2$ test, Mann-Whitney and Kruskall Wallis tests.
**Results and discussion:** Overall, 25 (16,7%) patients had delirium signs (positive 4AT scale) at PACU admission, 88% of whom had hypoactive features. At PACU discharge and 24h later, 7 (4,6%) patients had delirium signs (85% hypoactive, with 2 exchanging between hypoactive to hyperactive).
Advanced age and lower modified Aldrete score were associated with delirium signs at PACU admission (p=0.002;p=0.000), discharge (p=0.006;p=0.001) and 24h later (p=0.013;p=0.001).
Renal (p=0.042) and cardiovascular (p=0.018) comorbidities were associated with delirium signs at PACU admission, as well as use of metoclopramide (p=0.029). Higher ASA classification (p=0.000), diabetes (p=0.024) and preoperative cognitive deficit (p=0.016) were associated with delirium signs at PACU discharge. Higher ASA (p=0.003) and diabetes (p=0.023) were also correlated with delirium signs at 24h postoperative.
**Conclusions:** We found that POD is common and has highest incidence at PACU admission, with hypoactive features being more prevalent. During PACU stay there's a marked decrease, although some patients have delirium signs after PACU. There was no association with opioids or anesthetic drugs. To minimize POD and its worse outcomes, routine delirium monitoring at PACU and control of comorbidities are fundamental.
**Reference:**
1. Inouye SK, Westendorp RG, Saczynski JS.*Lancet* 2014;383:911-22

## 08AP07-5

### Quality of postoperative recovery and health status in patients scheduled for elective surgery

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**Introduction and Goal of Study:** Postoperative recovery is a complex process related to various outcomes, such as physiological end-points, and change in psychological status. Quality of postoperative recovery may be viewed as an important outcome after surgery and anesthesia. We aimed to assess and compare the quality of postoperative recovery and the health status before and after surgery in patients scheduled for elective surgery.
**Methods:** After approval by the institutional ethics committee, an observational, prospective study was conducted, including patients submitted to elective surgery. Inclusion criteria were: patients older than 18 years, undergoing non-cardiac, non-obstetric and non-neurological surgery, admitted to the Post Anesthetic Care Unit between June and August of 2015. Exclusion criteria included inability to give informed consent and regional anesthesia. Patients were evaluated with the Portuguese version of Postoperative Quality of Recovery Scale (PQRS) at baseline (up to 14 days before surgery - D0) and after surgery at minute 15 (T15), 40 (T40) and days 1 (D1) and 3 (D3). Poor quality of recovery (PQR) was defined as recovery in less than 2 domains at D1. The health status was assessed with the EQ-5D and the World Health Organization Disability Assessment Schedule (WHODAS) score 2.0 at baseline and 3 months after surgery (3M). Patients with WHODAS score≥25 at 3M evaluation were considered to have disability. The Mann-Whitney test, Chi-square or Fisher's exact test were used for comparisons.
**Results:** From 206 patients observed 182 were included in the study. At D1 patients with PQR had median VAS scores for EQ-5D similar to other patients (73 vs.80, p=0.314) but they had more problems in mobility (33% vs.14%, p=0.017), usual activities (29% vs.13%, p=0.045), pain/ discomfort (50% vs.20%, p=0.002) and anxiety/depression (88% vs. 55%, p=0.002). At 3M evaluation patients with PQR had median VAS scores for EQ-5D similar to other patients (80 vs.80, p=0.945) but they had more problems with pain (44% vs.21%, p=0.046). Patients with PQR had higher median WHODAS scores indicating worse health status at D0 (5.2 vs.2.1, p=0.035) but at 3M evaluation scores were similar (2.1 vs.2.1, p=0.964). PQR patients were not more frequently disable.
**Conclusion:** Patients with PQR had worst health status at D0 according to rate of problems in EQ-5D and to WHODAS scores, but at 3M their rates of problems in EQ-5D (except for pain) and their WHODAS scores were similar.

## 08AP07-6

### Patients after carotid endarterectomy: neurocognitive function, psycho-emotional state and preoperative cerebral perfusion level correlation studying

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**Background and Goal of Study:** We evaluated the role of neurocognitive function (NCF) and psycho-emotional state in patients after carotid endarterectomy (CEA) and the correlation of changes with baseline brain perfusion as previous studies provided inconsistent results [1,2].
**Materials and methods:** A study of 60 patients who underwent CEA for asymptomatic internal carotid artery stenosis in 2014-2015 was approved by the Institutional Review Board. The examination took place prior to CEA, intraoperatively and prior to hospital discharge; included duplex assessment with transcranial monitoring of cerebral blood. Cognitive function was evaluated with the Mini-Mental State Examination, Information-Memory-Concentration Test (IMCT), Frontal assessment battery, Wechsler Adult Intelligence Scale (WAIS), Clock Drawing Test and Schulte's test (ST), Hospital Anxiety and Depression Scale (HADS) and Covi Anxiety Scale (CAS). The assessment was held prior to CEA, at 1, 5 days and 3, 6 months after. The correlation between brain perfusion changes and NCF tests results was assessed with linear regression models.
**Results and discussion:** Patients showed various cognitive dysfunctions in total scale, immediate memory, language, psychomotor reaction rate, attention and emotional state before CEA. On the 2 day all the cognitive tests results were significantly lower. Anxiety was observed in 56%. The average

HADS Anxiety subscale score was 3±3.2 and CAS-5.2±1.8. After a week CEA total score returned to the preoperative level, except the ST and WAIS. Anxiety symptoms returned to the preoperative level. 3 and 6 months after CEA psychomotor reaction rate increased. According to HADS Depression subscale depression was found in 34.2%.
Correlation analysis of depression and postoperative cognitive dysfunction (HADS Depression Subscale vs. IMCT results) revealed an inverse preoperatively correlation (p=0.035) and marked negative 3-month post-operatively correlation (p=0.001). We observed better improvement on NCF after CEA in patients with reduced baseline perfusion according to duplex assessment (p=0.025).
**Conclusion(s):** CEA has beneficial effect on NCF. Patients with reduced baseline perfusion showed significant cognition improvement after CEA, whereas depressive disorders seriously increase cognitive functions decline risk.
**References:**
1. Belov U. Jour. Surgery 2014;8:53-58.
2. Kotov S. Europ Jour. of Neurol 2012;19(1):545.

## 08AP07-7

### Cerebral desaturation does not predict postoperative cognitive dysfunction in patients undergoing major shoulder surgery in the beach chair position

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**Background and Goal of Study:** Major shoulder surgery in beach chair position has been associated with severe adverse neurologic events even in healthy middle-aged patients (1,2). This has been attributed to the beach chair position itself as it reduces cerebral oxygenation.
The aim of the present study is to identify whether intra-operative episodes of cerebral desaturation are associated with postoperative cognitive decline.
**Materials and methods:** After obtaining ethics committee approval and informed consent, 10 adult patients (4 males, 6 females with mean age=64.5 y, SD=12.3y) without prior neurological and psychiatric disorder were enrolled prospectively. Neurocognitive function was assessed preoperatively, at the 3rd postoperative day and at 3 months postoperatively. Memory and attention performance were evaluated by means of the Auditory Verbal Learning Test (AVLT), the Stroop Color Word Test (SCWT) and the Symbol Digit Modalities Test (SDMT). Near-infrared spectroscopy (NIRS) was used to determine intra-operative episodes of cerebral desaturation, defined as a decrease in rScO2 of more than 20% compared to the baseline value.
Routine anesthesia was applied.
A repeated measures multivariate analysis of variance with time as within-subject variable (pre-surgery, post-surgery, and follow up assessment) was performed.
**Results:** Cerebral desaturation occurred in all patients. AUC (min-%), which represents the depth and duration of the rScO2 readings 20% below the baseline value, varied from 0 to 315 on the left frontal optode and from 0 to 1006 on the right, with a left mean AUC of 74.4 (SD=99.54) and a right mean AUC of 188.6 (SD=302.16).
No significant changes in overall cognitive test performance was observed over time, neither was there any significant interaction between time and age or cerebral desaturation. A significantly increased performance was observed between the postoperative and the follow-up assessment on the AVLT (p=.014), which may possibly be attributed to a test-retest effect.
**Conclusion(s):** These preliminary results suggest no association between episodes of cerebral desaturation and postoperative cognitive dysfunction. The current sample is yet too small to come to definite conclusions, and confirmation in an adequate sample-sized study population (as is planned in this ongoing study) is mandatory.
**References:**
1. Pohl A., Cullen D.J.:J Clin Anesth, 2005; 17: 463-9.
2. Friedman et al.: Orthopedics 2009; 32: 256.

## 08AP07-8

### Impact of poor quality of recovery in the medium term quality of life

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**Background and Goal of Study:** Quality of recovery (QoR) after anaesthesia is an important measure of the early postoperative health status of patients. The Quality of Recovery 15 (QoR-15) score has been shown to be correlated with postoperative quality of life (QoL). This study aims to determine the incidence and impact of poor quality of recovery (PQR) after surgery in patients' QoL and disability, 3 months after surgery (T2).
**Materials and methods:** After approval by the institutional ethics committee, an observational, prospective study was performed in patients scheduled for elective surgery under general anaesthesia. Were studied 208 patients admitted to the Post Anaesthetic Care Unit after plastic, gynaecologic, urologic and general surgery. Exclusion criteria were: age<18 years and inability to give informed consent or to speak Portuguese language fluently. Patients' demographics and perioperative data were collected. The QoR-15 score was applied preoperatively (T0) and 24h after surgery (T1). PQR were defined for patients having a QoR-15 score lower than the mean QoR-15 score at T1 minus 1 standard deviation. The EuroQOL 5 dimensions (EQ-5D) and 12-itens WHODAS questionnaires were used to measure QoL and disability (respectively), at T0 and T2. Patients with a WHODAS≥ 25 were considered disabled. Non-parametric tests were used for comparisons and Chi-square or Fisher tests for categorical variables.
**Results and discussion:** PQR was present in 17% of the 182 patients included. PQR patients had lower median QoR-15 scores at T0 (128 vs 140, p=0.002) and T1 (81 vs 127, p<0.001). At T0, PQR patients had more problems in anxiety dimension of EQ-5D (83% vs 55%, p=0.003). At T2, PQR patients had similar scores in EQ-5D dimensions and Visual Analogue Scale (VAS). Comparing EQ-5D VAS scores at T0 and T2 for both groups separately, differences were found between the two evaluations only for non-PQR patients (p=0.036), with better scores at T2. At T2, patients with PQR had similar rates of disability and WHODAS scores. When considered both groups separately, WHODAS scores at T2 were significantly better than at T0 (PQR patients, p=0.003; non-PQR patients, p<0.001).
**Conclusion(s):** PQR patients had lower scores for QoR-15, even before surgery. In patients without PQR, scores for EQ-5D VAS improved after surgery; in contrast to PQR patients for whom there were no improvements. Three months after surgery, patients were less disabled independently of their QoR.

## 08AP07-9

### Does aspirin therapy affect outcomes of patients underwent radical cystectomy?

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**Background and Goal of Study:** The current practice at our institution has been to continue aspirin therapy up to surgery. The impact to interrupt or continue therapy with aspirin in the perioperative period havebeen recently studied with controversial results.The aim of this study was to assess the safety of radical cistectomy in patients who received aspirin up to the day of surgery.
**Materials and methods:** We reviewed the records of all patients who underwent radical cystectomy (open and laparoscopic) and urinary diversion between January 2011 and June 2015 in our centre. Perioperative data from patients who underwent radical cystectomy were compiled and analyzed according to the use of aspirin. The unadjusted and adjusted relationship between aspirin use and postoperative complications was evaluated using logistic regression analysis and by the propensity score for aspirin use.
**Results and discussion:** We included 352 patients, 91 (25.9%) received aspirin up to the day of surgery. Aspirin patients had more co-morbidity and worse functional class (ASA physical status III/IV (%):67/12.1 vs. 37.9/4.2; p<0.001). Intraoperative blood loss, red blood cell transfusion, cardiac complications and mortality were significantly higher in aspirin group.However, after adjustment for most potential confounders factors, postoperative complications and mortality showed no statistically significant differences between the two groups (Table).

| | Unadjusted OR (95% CI) | Adjusted OR (95% CI) |
|---|---|---|
| Complications (any) | 1.2 (0.7-1.9) | 1.1 (0.5-2.2) |
| RBC transfusion | 2.5 (1.5-4.1) | 1.2 (0.6-2.4) |
| Postoperative blood loss (ml)* | 146.1 (35.4-256.8) | 85.9 (-68.8-240.7) |
| Respiratory complications | 2.1 (0.9-4.4) | 2.2 (0.7-6.3) |
| Cardiac complications | 2.9 (1.1-7.3) | 1.7 (0.4-6.8) |
| Neurologic complications | 2.7 (0.9-8.3) | 0.8 (0.1-4.1) |
| Re-operation | 2.3 (1.3-4.1) | 1.02 (0.3-3.9) |
| Mortality | 1.9 (1.2-3.3) | 1.1 (0.5-2.3) |

(*mean differences in ml) CI=Confident interval OR=Odds ratio RBC=Red blood cell

*[Postoperative Events related to aspirin use]*

**Conclusion(s):** Aspirin is not an independent factor for higher risk of postoperative complications or mortality in radical cystectomy. These data suggest that continuation of aspirin is relatively safe in this type of surgery.

**Reference:**

Kozek-Langenecker SA, Afshari A, Albaladejo P, Santullano CA, De Robertis E, Filipescu DC, et al. Management of severe perioperative bleeding: guidelines from the European Society of Anaesthesiology. Eur J Anaesthesiol. 2013;30(6):270-382.

## 08AP07-10

### Haematocrit and severity of disease scores in surgical ICU patients

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**Background and Goal of Study:** Severity of diseases scores systems classify critical ill patients and are useful to describe ICU populations. The association between hematocrit (Htc) and outcome relies on its inclusion on severity of disease scores. The aim of this study was to evaluate Htc at admission on a Surgical Intensive Care Unit (SICU) and severity of disease scores (APACHE II and SAPS II).

**Material and methods:** After study approval by the institutional ethics committee, an observational retrospective study was conducted. Patients submitted to non-cardiac elective and emergency surgery admitted at the SICU (from Jan 2006 to July 2013) were included. Exclusion criteria: age <18 years old; length of stay <12h, medical patients and patients readmitted in the context of initial admission in the study period. Patients were classified as having a low hematocrit (PLH) if they have an Htc <30 at SICU admission. APACHE II and SAPS II were calculated at admission. Patient's demographics and perioperative data were collected. The Mann-Whitney U test, Fischer's exact or Chi-square test were used for comparisons. Linear regressions analysis were done, with calculation of its 95% Confidence Interval.

**Results and Discussion:** From a total of 4565 patients, 4398 were included in the study. At SICU admission 25.6% were PLH. PLH had a higher rate of RCRI >2 (p=0.001). PLH had more often history of renal disease (p<0.001), but less frequently a history of cerebrovascular disease (p<0.001). In linear regression PLH had higher APACHE II scores (p<0.001) and SAPS II scores (p<0.001). For each unit increase in haematocrit value APACHE II score was 0.25 lower (95% confidence interval, -0.27 to -0.22) (p<0.001) and SAPS II score decrease 0.39 (-0.52, -0.26) (p<0.001). For length of stay in SICU there was a decrease of 1.38 (-1.60, -1.16) hours for each unit increase in haematocrit value (p<0.001).

**Conclusion (s):** PLH were more severely ill, had more comorbidities and stayed for a longer time in SICU.

## 08AP07-11

### Restrictive fluid regimen in combination with COX-2 inhibitors in open pancreatic surgery increases risk of postoperative acute kidney injury

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**Background:** Since 2015, all patients scheduled for open pancreatic surgery at Sahlgrenska University hospital, Gothenburg, Sweden are treated by an *Enhanced Recovery After Surgery* (ERAS) concept. In the Guidelines for ERAS from 2012, the recommendation is to maintain the body fluid-balance at near-zero.

Patients undergoing major surgery have an increased risk of developing postoperative acute kidney injury (AKI), and in the clinic we observed an increasing number of patients with postoperative acute kidney injury after the implementation of ERAS in this patient group.

**Goal of the study:** The aim of this study was to evaluate if patients undergoing open pancreatic surgery for malignancies and being treated with a restricted fluid regime in accordance with the ERAS concept are at greater risk of developing postoperative AKI than patients undergoing the same procedure treated with standard care. Furthermore if there was an increased risk for AKI in the ERAS group, we aimed to identify its cause.

**Methods and materials:** This is a retrospective study. We reviewed journals of all patients operated with open pancreatic surgery for suspected malignancies during 2014 (PreERAS) and 2015 (ERAS). The study was approved by the Ethical Review Board of Gothenburg. Fluid balance, administration of COX-2 inhibitor, preoperative creatinine and creatinine postoperative day (POD) 0-2, and mean arterial pressure (MAP) preoperative, during surgery and at arrival in the postoperative ward were recorded. Kidney disease improving global outcomes (KDIGO) criteria were used to define AKI.

**Results and discussion:** 12,5 percent of patients in the ERAS group and 1,8 percent of patients in the PreERAS group developed postoperative AKI stage 1, which was a significant difference. The increased incidence of AKI could ***not*** be explained by differences in ASA group, age, preoperative creatinine or peroperative hypotension. Moreover it could ***not*** be explained only by the restrictive fluid regimen but by the combination of restrictive fluid regimen and the use of coxibs.

**Conclusion:** Open pancreatic surgery with a restrictive fluid regimen carries an increased risk of postoperative AKI if patients are also treated with coxibs. It is therefore suggested that in protocols including a restrictive fluid regimen for open pancreatic surgery, coxibs should be omitted.

## 08AP07-12

### Computer based versus standard face-to-face preoperative assessment in a regional hospital

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**Background and Goal of Study:** The fundamental role of the preoperative evaluation (PE) in modern anesthesia practice is well established. However, controversy still reminds about when, how and who should perform it. The effectiveness of a method of PE based on electronic patient records was assessed through comparison with standard face-to-face evaluation.

**Materials and methods:** In this observational, retrospective, cohort study, the periods of the years 2008 (Standard method) and 2012 (Computer based method) were compared. All patients scheduled for surgery, both inpatient and outpatient were included, except for those who underwent emergency surgery.

Computer based PE was implemented in our hospital since 2009 due to the possibility of accessing electronic patient records from any computer terminal in our institution (ARGOS project[1]). Once the computer based PE was done, a phone call to the patient was made to confirm all data and decide if a face-to-face PE or additional tests were necessary. Computer based PE was then completed the same day of the surgery, i.e.: Airway examination.

In both years the number of face-to-face PEs, preoperative tests and ratio of cancellations were analyzed. Chi-squared was employed for statistical analysis.

**Results and discussion:** Both periods were comparable (Table 1). There was a dramatic reduction in the number of face-to-face PEs from 5.408 in 2008 to 1.890 in 2012. The number of preoperative tests also fell, with a reduction of 63,4% for laboratory tests, 11% for ECGs and 26% for CxRs. Finally and most important, the ratio of cancellations did not experienced any significant change, being 2,3% in 2008 and 1,75% in 2012. (Table 2).

| | 2008 | 2012 | P value |
|---|---|---|---|
| Cataract surgery/ Inguinal Hernia | 1.074/ 305 | 1.101/ 362 | >0.05/ >0.05 |
| Amigdalectomy/ Knee arthroscopy | 89/ 85 | 98/ 97 | >0.05/ >0.05 |
| Colorectal surgery/ Cholecistectomy | 60/ 143 | 63/ 103 | >0.05/ >0.05 |
| TKA/THA / Hallux valgus | 186/ 122 | 178/ 124 | >0.05/ >0.05 |
| Histerectomy/ Septoplasty | 80/ 58 | 71/ 88 | >0.05/ <0.05 |
| TUR/ Radical prostatectomy | 115/ 35 | 116/ 40 | >0.05/ >0.05 |
| GI suite/ Total | 1.146/ 5.408 | 2.473/ 6.867 | <0.05/ <0.05 |

*[Table 1. Procedures per year]*

| | 2008 n= 5.408 | 2012 n= 6.867 | Absolute reduction | relative reduction | P value |
|---|---|---|---|---|---|
| Standard PEs | 5.408 (100%) | 1.890 (21%) | 79% | | <0.05 |
| Lab. tests | 4.240 (78,4%) | 1.044 (15%) | 63,4% | 75,4% | <0.05 |
| CxR | 654 (12%) | 79 (1,1%) | 11% | 87,93% | <0.05 |
| ECG | 1.744 (32,2%) | 428 (6,2%) | 26% | 72,02% | <0.05 |
| Cancellations | 2,3% | 1,75% | | | >0.05 |

*[Table 2. Results]*

**Conclusion(s):** Computer based PE might be an effective alternative to conventional face-to-face PE in regional hospitals with a suitable electronic database system.

## 08AP08-1

### Agreement between two methods for measuring pulse pressure variation. Cross-sectional study

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**Goal of Study:** New smartphone application called Capstesia estimates advanced haemodynamic parameters (cardiac output [CO], pulse pressure variation [PPV], max dP/dt) after digitalising and analysing the invasive arterial pressure (PA) curves from the snapshot of patient bedsidemonitor. The main aim of the study was to assess whether Capstesia Algorithms are valid to provide data not differing significantly from the traditional method (direct analysis of pressure signal).
**Materials and methods:** We prospectively assessed the level of agreement(L of A) between the direct analysis of images and that from recording and measuring PPV in 20 patients who had an arterial catheter in ICU at Araba University Hospital, from January to February 2015. Patients were monitored using Dräger® equipment. Signals were reproduced in real time on a remote computer (speed:25 mm/s, 30-s sections were registered, 3 complete PA curve screens, 4 recorders/ patient, analysed by MatlabR2009A). Subsequently, a photo was taken of each complete screen using the App.We set the threshold for an agreement at ±2.5 PPV due to the field work done. For a statistical power of 80% and a 95% confidence level, we estimated 235 images required to value the L of A between the two methods for measuring PPV. The primary endpoint was the PPV across each screen. Other variables recorded: sex, SOFA, type of access, CO and max dP/dt. The L of A between the methods was measured by intraclass correlation coefficients(ICCs: >0,75: very good agreement), and the method of Bland&Altman.
**Results:** We included 229 images; mean age of 69.55 years(SD10.13) mean SOFA of 7.55(SD5.88). PPV Concordance analysis: ICC 0.991(considered excellent, indicating either of the methods could be used). Analysis Bland&Altman plot, the mean of the differences is small(0.50) and only 6.14% of data points lay outside the L of A. We found clinically acceptable L of A for low (≤10%), moderate (10-15%) and high (≥15%) values of PPV; 7, 1 & 4 data points (6.14%, 3.70% and 4.6% of points) fell outside the L of A, respectively. CO and max dP/dt got excellent results(ICCs, 0.966 and 0.962, respectively), and with only 2(0.87%) and 11(4.85%) points outside the L of A in the Bland-Altman plot.
**Conclusion:** Capstesia is reliable, regardless to the magnitude of the variation, pointing out whether patients would respond to fluidtherapy in order to increase their CO. Therefore, it's possible to use both methods for the stated purpose.

## 08AP08-2

### Cardiac index and stroke volume variation as parameters to guide fluid therapy and hemodynamic management in renal transplantation in comparison to conventional management

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**Background:** Inefficient fluid therapy may cause organic hypoperfusion, but also fluid positive imbalances may produce incremental in morbidity and mortality in the critically ill patients. Renal chronic disease produce many changes, including fluid metabolism alterations, that is why is quite important make good decisions in fluid therapy. Renal transplant surgery implies a critical circumstance, which most be carefully in management. Make the correct decision is not easy because common parameters as central venous pressure (CVP) and mean arterial pressure(MAP [static parameters]) do not represent correctly the hydric and hemodynamic patient status. Dynamic parameters as stroke volume variation (SVV), cardiac index (CI) and systemic vascular resistance (SVR) could conjunctly predict fluid responsiveness.
**Goal of the study:** Main objective was to compare and determine differences between conventional management and fluid and hemodynamic therapy guided with SVV and CI in renal transplant patient.
**Material and methods:** Controlled clinical study performance at General Hospital in the National Medical Centre "La Raza" in Mexico city.
Two groups, 40 each one: first received parental fluid, vasopressor and inotropic treatment base on CVP (Between 10-15 mmHg) and MAP (>90 mmHg), know as conventional management, meanwhile second group therapy was guide in SVV (>12% and MAP <90 mmHg = Fluid bolus), CI (<2.5 and SVV <12= Dobutamine) and SVR (<800 d and MAP <90 mmhg = Norepinephrine), using FloTrac/Vigileo monitor by Edwards Lifesciences.
**Results:** There was statistical significance for the study group on the parenteral fluid balance with less positive values (P=0.015). Also Consumption of Dobutamine was higher in Control group (P=0.023), there was no difference in Norepinephrine use.
**Conclusions:** Management of liquids and hemodynamic therapies oriented by values of SVV, CI and SVR allows a better administration of liquids and inotropes and vasopressors, avoiding positive imbalances and their deleterious effects on patients receiving kidney transplantation.
Is quite important to use less fluids, but how much is too mucho r too less. That is why monitoring hemodynamic is crucial.
**References:**
We use 26 references.
**Acknowledgements:** To Muñoz Eduardo

## 08AP08-3

### Clinical audit on impact of protocol based management in preventing the incidence of perioperative hypothermia

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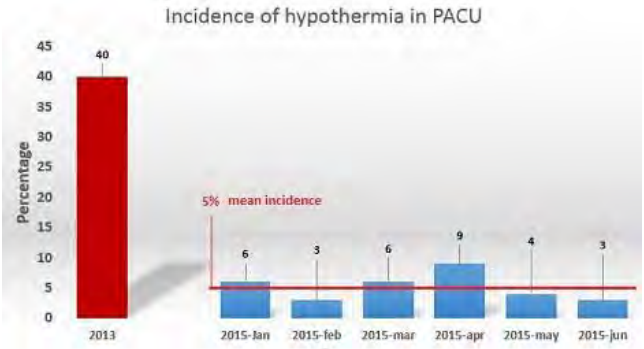
**Background and Goal of Study:** Unintentional hypothermia is known to occur in perioperative setting and the associated adverse events are well documented. We audited the incidence of hypothermia in patients admitted to Post Anaesthesia Care Unit (PACU) to verify the influence of perioperative warming measures and monitoring.
**Material and methods:** As a part of our departmental quality control initiatives, we are auditing the incidence of hypothermia (temp<36°C) in all adult patients on admission to PACU. Temperature is recorded with Genius™ 2 tympanic thermometer and plotted on the PACU monitoring chart. The reported incidence is compared with previous audit report in 2013, prior to institution of protocols for prevention of hypothermia.
**Results and discussion:** The audit done in 2013 showed 40% incidence of hypothermia in patients admitted to PACU, 79% of them received general an-

aesthesia. Intraoperative temperature monitoring was done in only 8% cases and warming measures were done in 24% of cases. After the audit, programs were conducted to improve the awareness among anaesthesiologists to use intraoperative temperature monitoring and implementation of protocol to prevent perioperative hypothermia. Continual audit of temperature on arrival to PACU showed progressive improvement and the average incidence in the first 6 months of 2015 is 5% with a range of 3-9% (Figure-1).




*[Comparison of incidence of hypothermia in PACU]*

**Conclusion:** Prevention of perioperative hypothermia is part of standard of care in modern anaesthesia practice. Anaesthesiologists can take initiatives for the same starting from the preoperative period. Preventing perioperative shivering and hypothermia can also lead to improved patient comfort. From our experience we would suggest continued auditing of perioperative hypothermia to reinforce awareness regarding prevention of hypothermia.

## 08AP08-4

### Urologic endoscopic procedures: does active warming matter?

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**Background and Goal of Study:** Anaesthetic induced impairment of thermoregulory control and surgical exposure make patients prone to heat loss. Irrigation fluids used in urologic endoscopic surgery and low operating room temperature are other factors accounting for that loss. Passive insulation and forced air warming devices are simple techniques that can be used to prevent it. The aim of this work was to evaluate the effect of active warming in preventing perioperative heat loss in patients submitted to urologic endoscopic surgery.
**Materials and methods:** After Hospital Ethics Committe approval, a prospective audit was conducted including 51 patients submitted to endoscopic urologic procedures at a tertiary hospital, from March to July 2015. Gender, age, American Society of Anaesthesia Physical Status (ASA), Body Mass Index (BMI), type of anaesthesia, duration of surgery, use of active warming and hospital length of stay were collected. Tympanic temperature was monitored using Grado® thermometer (RM205V model) on five moments: Operating Room arrival (T1), after anaesthetic induction (T2), end of surgery (T3), Post Anaesthesia Care Unit arrival (PACU) (T4) and at PACU discharge (T5). ΔT3-T2, ΔT5-T2 and ΔT5-T4 were calculated. Results - number, percentage, mean ± standard deviation (SD) and median. Test U Mann-Witney was used ($p<0,05$) (SPSS® v.22).
**Results and discussion:** 51 patients included (76% male), age between 26 and 92 years old (median 69). ASA 1: 6%; 2: 53%; 3: 41%. BMI was 26,11 ± 2,91 Kg/m². 53% submitted to general anaesthesia, surgery mean duration 51 minutes (± 24). 61% (n=31) actively warmed during surgery. Hospital length stay 4,06 ± 2,67 days.
T1: 36,08 ± 0,46 ºC; T2: 35,87 ± 0,57 ºC; T3: 35,12 ± 0,64 ºC; T4: 34,93 ± 0,6 ºC; T5: 35,41 ± 0,5 ºC.
We found statistically significant difference between patients actively warmed (PW) and patients non-active warmed (PnW) during T5-T2 period ($p=0,001$). During surgery procedure (T2-T3), although there was a difference in TV between PnW (-0,99 ± 0,59ºC) and PW (-0,59 ± 0,61ºC), this result was not statistically significant ($p=0.09$).
**Conclusion(s):** In our prospective audit study it seems that active warming influence the perioperative heat loss. PW during urologic endoscopic procedures are less likely to have heat loss at PACU discharged. This study let us think about the importance of developing active warming strategies.

## 08AP08-5

### Type of anaesthesia or active warming influences the heat loss in older patients?

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**Background and Goal of Study:** Advanced age has been recognized as a risk factor for perioperative heat loss (HL). Thermoregulatory responses are decreased mostly due to altered regulation of peripheral blood flow in the setting of reduced microcirculation. Studies' objectives:
1. evaluate in patients submitted to general (PGA) and local (PLA) anaesthesia the relation between perioperative temperate variation (TV) and age;
2. Evaluate in active warmed (PaW) and non-active warmed (PnaW) patients the relation between perioperative TV and age.
**Materials and methods:** After Hospital Ethics Committe approval. A prospective audit was conducted including 200 patients submitted to minor surgical procedures at a tertiary hospital, between March to July of 2015. Gender, age, American Society of Anaesthesia Physical Status (ASA), Body Mass Index (BMI), type of anaesthesia (GA/LA), surgery duration, use of active warming (PaW/PnaW) and hospital length stay were collected. Tympanic temperature was monitored using Grado® thermometer (RM205V model) on five moments: Operating Room arrival (T1), after anaesthetic induction (T2), end of surgery (T3), Post Anaesthesia Care Unit arrival (PACU) (T4) and at PACU discharge (T5). ΔT3-T2, ΔT5-T1 and ΔT5-T4 were calculated. Results - number, percentage, mean ± standard deviation (SD), and median. Spearman correlation test was used ($p<0,05$) (SPSS® v.22).
**Results and discussion:** 200 patients included (55% female); age between 19 and 92 years old (median 61). ASA 2: 69%. BMI 27,12 ± 4,23 Kg/m². 85% PGA, surgery duration 55 ± 32 minutes. 25% (n=50) actively warmed during surgery. Mean hospital length stay 3,35 ± 3,28 days.
T1: 36,24 ± 0,51 ºC; T2: 36,01 ± 0,6 ºC; T3: 35,5 ± 0,68 ºC; T4: 35,33 ± 0,65 ºC; T5: 35,65 ± 0,56 ºC. ΔT3-T2: -0,74 ± 0,56ºC, ΔT5-T1: -0,58 ± 0,51ºC and ΔT5-T4: 0,33 ± 0,43ºC.
Analyzing PGA a statistically significant relation between ΔT3-T2 and age ($r=-0,18$; $p=0,02$) was found. We didn't observed relation in PLA between ΔT3-T2 and age. In PnaW we identify a negatively relation between ΔT3-T2 and age ($r=-0,22$; $p= 0,008$); in PaW we didn't identify relation between ΔT3-T2 and age.
**Conclusion:** In our prospective audit study it seems that older PGA are more prone to HL during surgery (T3-T2). Older PnaW are more likely to have HL during surgery (T3-T2). In PaW we didn't found relation between age and TV during surgery (T3-T2). This study let us think about the importance of developing active warming strategies.

## 08AP08-6

### Total intravenous anaesthesia versus single pharmacological antiemetic prophylaxis - a systematic review and meta-analysis

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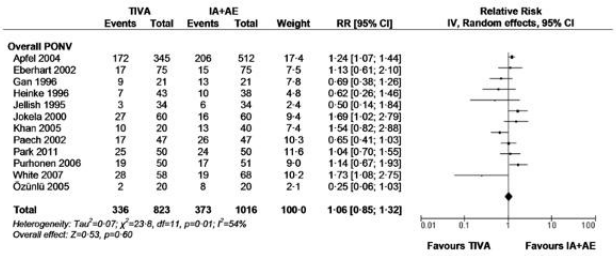
**Background:** Postoperative nausea and vomiting (PONV) are among the most unfavourable outcomes after anaesthesia (1). Because they are broadly attributed to the use of inhaled anaesthetics (IA), substitution of IAs with propofol (TIVA) is a common strategy for PONV prophylaxis in high-risk patients. Since IAs may be favourable in some occasions, the effect of TIVA, as compared to the addition of single pharmacological antiemetic prophylaxis to IA, on PONV incidence needs to be established.
**Methods:** After registration at PROSPERO (Reg.-No. CRD42015019571), we performed a systematic review and meta-analysis on studies that randomized adult patients to either TIVA or IA with single pharmacological prophylaxis. The primary outcome was the overall incidence of PONV. Secondary outcomes included incidences of postoperative vomiting (POV), early (up to 2-6 hours) and late PONV, need for antiemetic rescue medication as well as any reported adverse events. Relative risks (RR) with 95% confidence intervals were calculated using inverse variance weighting and a random effects model. Publication bias was assessed with weighted regression analysis of funnel plot asymmetry.
**Results:** We included 14 studies with a total of 2,051 patients in our analysis. The risk for overall PONV was similar between the two strategies (RR 1.06,

95% CI 0.85; 1.32, GRADE-rating: moderate). Further, there was no difference with regard to POV, late PONV or need for rescue medication. However, compared to IA plus single antiemetic prophylaxis, patients receiving TIVA had a higher risk to develop PONV in the late phase (RR 1.41; 95% CI 1.10; 1.79, p=0.006, figure 1). The risk for adverse events, which was reported by four studies, did not differ between the two groups. Funnel plot analysis found evidence of publication bias favouring TIVA.




*[Figure 1. Forest plot for the main outcome overall postoperative nausea and vomiting (PONV). TIVA: Total intravenous anaesthesia; IA+AE: Inhalative anaesthesia with pharmaceutical antiemetic prophylaxis]*

**Conclusion:** This meta-analysis provides solid data that IA+AE is at least equal to TIVA in preventing PONV based on direct comparisons. Thus, in case of presumed favourable effects of inhalational anaesthesia, adding one antiemetic to IA is at least as effective in terms of preventing PONV as substitution of the IA with propofol.

**Reference:**

1. Anesth Analg 2014;118:85-113

## 08AP08-7

### Incidence of akathisia after PONV prophylaxis with droperidol or ondansetron in outpatient surgery. A multicenter controlled randomized trial

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**Background and Goal of Study:** Droperidol (DRO) is regularly used for prevention of postoperative nausea and vomiting (PONV)[1]. Akathisia, a possibly harmful side-effect, is an extra-pyramidal symptom induced by dopamine antagonists, which can lead to readmissions after ambulatory surgery.
The aim of this controlled randomized trial is to evaluate the incidence of akathisia after PONV prophylaxis with DRO or ondansetron (OND), in outpatient surgery.
**Materials and methods:** With local ethics committee approval (CPPEst4 13/40) 297 patients with an Apfel score ≥ 2, scheduled to undergo ambulatory surgery, were randomized to receive DRO 0.625 mg, or DRO 1.25 mg or OND 4mg. Barnes' rating scale[2] was used for the global clinical assessment of akathisia (defined by a score ≥ 2). Data were analysed using Bayesian methods. An effect is considered as significant if the probability that the effect exceeds a given threshold is larger than 0.95. Results are expressed as mean or rate and 95% credibility intervals.
**Results and discussion:** There were no differences for the patients characteristics in the 3 groups. Higher number of women is due to the fact that the female sex is a risk factor in the Apfel score, which was an inclusion criteria. No differences were observed across the 2 DRO groups. Incidence of akathisia was 4/171 in the DRO groups (0.625 and 1.25 mg) and 1/121 in the OND group. The Bayesian estimates rates are 2.7% and 1.4% respectively and Pr(DRO>OND)= 78.2%. Taking account of prior data[3] Pr(DRO>OND)= 93.1%. We observed one case of marked akathisa in the DRO 1.25mg group.

| | DRO 0.625mg | DRO 1.25mg | OND 4mg |
|---|---|---|---|
| N | 87 | 89 | 121 |
| Gender (male) | 19 (21.8%) | 17 (19.1%) | 32 (26.5%) |
| Age (years) | 43.1 [40.2 ; 45.9] | 38.3 [35.6 ; 41.0] | 39.0 [36.9 ; 41.1] |
| Weight (kg) | 71.9 [69.2 ; 74.7] | 69.2 [66.2 ; 72.3] | 71.8 [68.4 ; 75.1] |
| Height (cm) | 167.7 [166.0 ; 169.4] | 167.2 [165.4 ; 169] | 168.8 [167.2 ; 170.4] |
| Number of akathisia (score≥2) (%, Bayesian estimate) | 1 (2.0%) | 3 (4.2%) | 1 (1.4%) |
| Marked or severe akathisia (score≥4) | 0 | 1 | 0 |

*[patients characteristics, incidence of akathisia]*

**Conclusion(s):** Akathisia may be more frequent after DRO when compared with OND prophylaxis for PONV. The use of 1.25mg of DRO can lead to marked akathisia. Better knowledge of akathisia and its objective assessment will allow the anaesthesists to better take this side effect into account.

**References:**

1. Schaub I, Lysakowski C, Elia N, et al. EJA. 2012;29:286-294
2. Barnes, TR. Br. J. Psychiatry J. Ment. Sci. 1989;154:672-676
3. Timbolschi D, Schaeffer, P. Vidailhet, P,et al. AA. 2009;108: S-15

## 08AP08-8

### Impact of perioperative dehydration on postoperative nausea and vomiting in patients undergoing radical cystectomy and urinary diversion: a secondary analysis of a randomized clinical trial

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**Background and Goal of Study:** Postoperative nausea and vomiting (PONV) can augment healthcare costs by delaying postoperative recovery including return of gastrointestinal function. It has been suggested that preoperative dehydration may exacerbate PONV and that administration of supplemental fluids may reduce PONV. However the impact of postoperative dehydration on PONV is still unknown. The goal of this analysis was to determine if early postoperative dehydration is related to PONV in patients undergoing open radical cystectomy.
**Materials and methods:** Secondary analysis from a randomized, parallel-group single-centre trial including 44 consecutive patients undergoing open radical cystectomy with urinary diversion receiving either a glucose 5% potassium based crystalloid solution (G5K group) or a balanced crystalloid solution (control group) perioperatively in the setting of a fluid management aiming for a zero balance. Urinary analysis (osmolality ($U_{osm}$), chloride ($U_{Cl}$), sodium ($U_{Na}$)) was performed on the urine taken just before surgery started, and then 6 h postoperatively. Dehydration was defined as a urine osmolality $U_{osm}$>600mOsmol/kg.
**Results and discussion:** The groups were similar regarding surgical characteristics, and intraoperaitve hydration (G5K group: median 750ml [range: 500-1700ml] vs. control group 975ml [400-1600ml], *P*=0.185). Preoperative dehydration was found in 36% (n=16/44) with no difference between the 2 groups. Preoperative dehydration was not associated with the presence of early postoperative nausea (*P*=1.000) or early postoperative dehydration (*P*=0.756).Dehydration 6 h postoperatively was present in 8/22 patients (36%) in the control group and in 4/22 patients in the G5K group (18%), *P*=0.310. Two patients in the G5K group and 2 patients in the control group experienced nausea ($n_{total}$=4/44, 9%) during the first 6 h postoperatively. These patients with nausea had significantly elevated $U_{osm}$ 685mOsmol/kg [range: 647-735] vs. 582mOsmol/kg [215-934], *P*=0.008. Multiple logistic regression analysis detected $U_{osm}$ (OR 0.984 [95% CI 0.974-0.994]; *P*=0.002) and $U_{Cl}$ (OR 1.021 [95% CI 1.001-1.042]; *P*=0.039) as predictors for early postoperative nausea. The choice of crystalloids did not predict postoperative nausea within 6 h after surgery.
**Conclusion(s):** Perioperative dehydration was neither common nor severe in this setting. Elevated urine osmolality during the early postoperative period was associated with nausea.

## 08AP08-9

### Big data: post-operative nausea and vomiting electronic reporting

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**Background and Goal of Study:** Post-operative nausea and vomiting (PONV) is defined as nausea and/or vomiting within 24 hours of anaesthesia and has an incidence of 30% in all post-surgical patients (1). In 2014 an electronic prescription program (HEPMA) was introduced to improve medicines safety and governance. This provides a large repository of information regarding prescribing and drug administration practices. Combined with data from the theatre management system (Opera), we created a cohort of prescribing and anaesthetic data.
**Materials and methods:** We aimed to provide PONV reports for each anaesthetist specific to their practice to allow them to undertake targeted improvement. A snap-audit of 20 patients in recovery demonstrated that all patients received an anti-emetic for PONV, with one patient receiving an anti-emetic for itch and PONV. This was the basis for the assumption that non-regular antiemetic administration occurred during episodes of PONV.
Data was collected for all surgical procedures via Opera system from July 2014-July 2015. Data was subdivided into risk factors (sex/surgical specialty/age). This was combined with data from HEPMA and analysed using MS EXCEL 2010. Patients receiving surgery without a general anaesthetic; and those receiving regular anti-emetics were excluded. Patients who had both regular and PRN anti-emetic use were included. An example of an individualized report is shown below:

| Antiemetic Report | | Dates July 2014- July 2015 | | | | |
|---|---|---|---|---|---|---|
| Anaesthetist | Departmental Data | | | x | | |
| | Departmental Data | % of all cases | | Your Data | % of Department | |
| Number of Cases | 10096 | 100% | | 147 | 1% | |
| Female | 5846 | 58% | | 60 | 1% | |
| Male | 4106 | 41% | | 87 | 2% | |
| <16 | 2089 | 21% | | 7 | 0% | Variance from department mean |
| | | | | | Prevalance | |
| PONV events (all) | 1236 | 12% | | 17 | 12% | -1% |
| Female | 968 | 17% | of all cases (Female) | 10 | 17% | 0% |
| Male | 264 | 6% | of all cases (Men) | 7 | 8% | 2% |
| <16 | 46 | 2% | of all cases (children) | 1 | 14% | 12% |
| Breakdown by specialty | | as % of all PONV | | Your Data | | |
| Procedure Specialty | PONV Events | events | As a prevalance | (number of PONV) | Prevalance | Prevalance vs Dept |
| General Surgery | 404 | 33% | 14% | 1 | 6% | -8% |
| Trauma and Orthops | 273 | 22% | 11% | 14 | 11% | 1% |
| Ear, Nose & Throat | 155 | 13% | 11% | 0 | N/A | N/A |
| Maxillo Facial | 99 | 8% | 13% | 0 | N/A | N/A |
| Gynaecology | 296 | 24% | 20% | 7 | 67% | 47% |
| Oral Surgery | 6 | 0% | 1% | 0 | N/A | N/A |
| Anaesthetics | 0 | 0% | 0% | 0 | N/A | N/A |
| Vascular Surgery | 1 | 0% | 5% | 0 | N/A | N/A |
| Plastic Surgery | 1 | 0% | 3% | 0 | N/A | N/A |
| Ophthalmology | 1 | 0% | 2% | 0 | 0% | 0% |
| Grey shaded areas have low numbers and so wide confidence intervals | | | | | | |

*[Individualized Report]*

**Results and discussion:** Of the 10096 general anaesthetic cases, 1236 (12%) had PONV. The prevalence was 17% in women, 6% in men and 2% in children. The surgical specialties with the highest prevalence were Gynaecology 20%, General surgery 14% and Maxillofacial 13%.
**Conclusion(s):** Our study supports current evidence for PONV risk factors. We believe this process will be effective targeting areas for reducing PONV in our department. A confidential report was sent out to each permanent anaesthetic staff member on their incidence of PONV aiding reflection on their practice, and will be re-audited in the future.
**Reference:**
1. Nausea and vomiting after surgery, Pierre S et al; Contin Educ Anaesth Crit Care Pain *mks046 first Published online August 11, 2011*

## 08AP08-10

### Quality of recovery and postoperative nausea and vomiting

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**Background and Goal of Study:** Postoperative nausea and vomiting (PONV) are among the most common side-effects of surgery and anaesthesia. It can decrease the quality of recovery after anaesthesia, as measured by tools like the Quality of Recovery-15 (QoR-15) or the Post-Operative Quality of Recovery Scale (PQRS).
This study aimed to evaluate incidence of PONV and determine its implication in postoperative health status of patients.
**Materials and methods:** After approval by the institutional ethics committee, an observational, prospective study was performed in patients undergoing non-cardiac, non-obstetric and non-neurological elective surgery under general anaesthesia admitted at PACU. Exclusion criteria: age <18 years old and inability to give informed consent. A range of measures of quality of recovery were collected using the PQRS before surgery, at 15 and 40 min, 1 and 3 days. QoR-15 was also assessed on the day before surgery (T0) and repeated 24 hours after surgery (T1).
Recovery was defined as return to baseline values or better for all questions within each PQRS' domain (physiological, nociceptive, emotive, activities of daily living and cognition).
The occurrence of PONV was recorded during 3 days after surgery. Patient's demographics and perioperative data were collected. Descriptive analysis were carried and the Mann-Whitney test, Chi-square or Fisher's exact test were used for comparisons.
**Results and discussion:** Two-hundred and three patients were enrolled for this study. The incidence of PONV was 23.2% (n=47). There were no differences in gender, BMI, type and duration of anaesthesia or total length of stay among patients with PONV.
However, patients with PONV were younger (p=0.024) and with lower ASA physical status score (p=0.008). Patients with PONV had lower median QoR-15 scores at T0 (131 vs 139, p=0.023) and T1 (105 vs. 126, p<0.001). At T1 PONV patients scored lower in 8 questions of QoR-15. PQRS assessment was not able to find differences in overall rate of recovery in any of the evaluated domains. Anti-emetic prophylaxis was similar among patients who had PONV (p=0.980).
**Conclusion(s):** QoR-15 was able to reveal differences in patients with PONV, suggesting its adverse impact in postoperative recovery. In contrast PQRS was not able to detect impact in overall recovery.

## 08AP08-11

### An audit to postoperative nausea and vomiting prophylactic regimens comparing ondansetron and droperidol

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**Background and Goal of Study:** Postoperative nausea and vomiting (PONV) remain a common adverse outcome[1].
Prophylactic protocols should be implemented and audited to improve adherence[1].
In our institution, we recommend DHBP (droperidol) as second antiemetic (following dexamethasone). However many anaesthesiologists use ondansetron as second drug. The aim of this study was to audit PONV incidence and related outcomes of patients using DHBP *versus* ondansetron as second antiemetic.
**Methods:** Data collected during a prospective audit to all adult patients submitted to inpatient elective surgery from March-May 2014. PONV incidence was evaluated 24h after surgery. PONV intensity was evaluated according to Portuguese version of PONV intensity scale[2] and verbal numeric scale (0-10). Fisher, t student and Mann-Whitney tests were used (p<0.05).
**Results and discussion:** From 1006 patients audited, 442 patients had medium risk according to protocol (table 1), and 2 prophylactic drugs were used.

| Risk Factors (RF) | LOW risk | |
|---|---|---|
| Female | 0 RF | No prophylaxis |
| Non smoker | 1 RF | Dexametasone 4mg ev induction or DHBP 0,625mg ev end of the surgery |
| Age <50 years old | MEDIUM risk | |
| Previous PONV / motion sickness | 2 - 3 RF | Dexametasone 4mg ev induction and DHBP 0,625mg ev end of the surgery |
| Volatile agents / N2O | 4 - 5 RF | Dexametasona 4mg ev induction and DHBP 1,25mg ev end of the surgery |
| Anaesthesia >120min | HIGH risk | |
| Post-operative opioids | >5 RF | Dexametasone 4mg ev induction and DHBP 1,25mg ev end of the surgery and Ondansetron 4mg ev end of the surgery |

*[PONV Risk Factors and Recommended Protocol]*

292 patients received dexamethasone 4mg+DHBP 0,625mg (Drop Group), 150 received dexamethasone 4mg+ondansetron 4mg (Ond Group). No differences were found between groups in PONV and vomiting (POV) incidence and PONV intensity. Ond Group presented an earlier first meal after surgery, however PONV moment after surgery, time to get out of bed and postoperative headache incidence were not significantly different among groups.

| Outcome | PONV incidence (%) | PONV intensity2 (median, range) | PONV intensity 1-10 (median, range) | VOP incidence (%) | Moment of PONV (h) (average, SD) | Time to first meal (h) (average, SD) | Time to get out of bed (h) (average, SD) | Headache incidence (%) |
|---|---|---|---|---|---|---|---|---|
| Drop Group | 24,0 | 0,67 (0 - 150) | 5 (0 - 10) | 11,6 | 11,2 (0,92) | 10,4 (0,4) | 13,7 (0,4) | 16,8 |
| Ond Group | 21,3 | 0,46 (0 - 150) | 5 (2 - 10) | 8,0 | 8,2 (1,5) | 9,1 (0,5) | 12,6 (0,6) | 18,7 |
| p | 0.553 | 0.972 | 0.801 | 0.255 | 0,078 | 0.031 | 0,082 | 0,691 |

*[PONV outcomes between groups]*

**Conclusion:** Anaesthesiologists may have preferences about antiemetic drugs. Previously safety warnings and patients' condition may influence choices.
In this audit, we found no clinical significant difference between DHBP or ondansetron as second PONV prophylactic drug, so our protocol could consider both options. For a more accurate conclusion, a randomized controlled study should be done.

**References:**

1. AnesthAnalg 2014;118 (1):85-113
2. RevBrasAnestesiol 2013; 63 (4): 340-6

## 08AP08-12

### Enhances recovery after surgery programs vs standard procedure in radical cystectomy. Systematic review, meta-analysis and sequential analysis of observational studies

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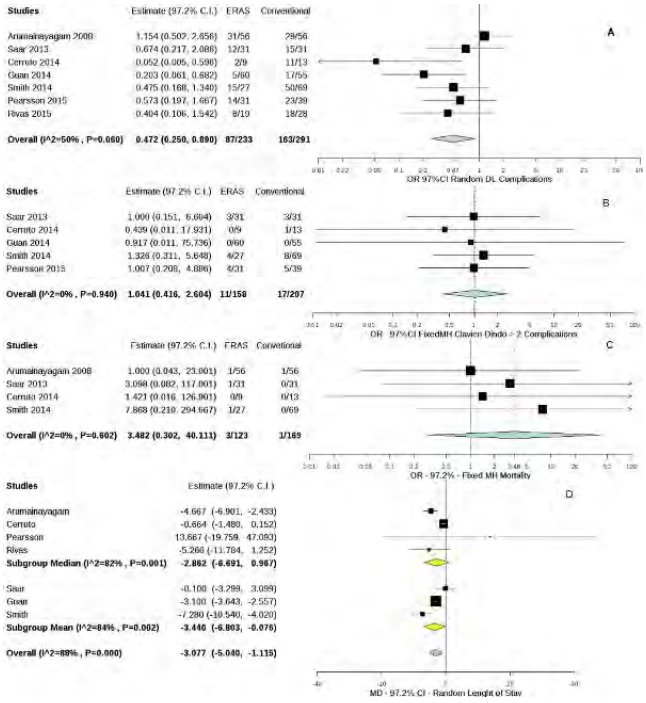
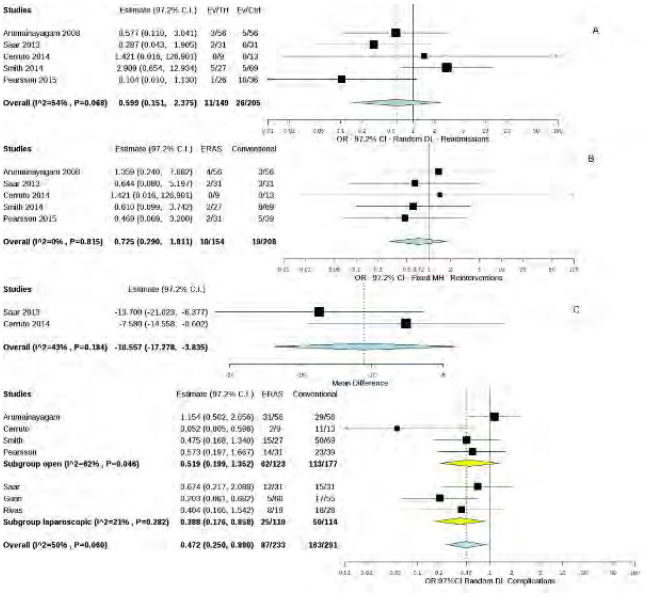
**Background and Goal of Study:** To summarize the available information that compares ERAS protocols[1] with perioperative conventional therapies in radical cystectomy.
**Materials and methods:** PROSPERO Register number: CDR42015017596[2]. A systematic review was conducted following the PRISMA-p statement. Cohort studies or randomized trials comparing the ERAS program effects vs standard perioperative process in patients undergoing radical cystectomy were included. Primary outcome was the rate of complications. The secondary outcomes were grade Clavien-Dindo>2 complications, mortality, reintervention and readmission rates, length of stay and time until mobilization. Bias risk was performed using Newcastle-Ottawa and Jadad scales. A meta-analysis and trial-sequential-analysis were performed. An analysis of subgroups depending on the approach of the surgery (open vs laparoscopic or robotic) was carried out. A meta-regression study was performed between those outcomes and the number of ERAS items that had been carried out in each study.
**Results and discussion:** 8 articles were included for revision, 7 articles in the meta-analysis (n = 524). Significant differences between ERAS and standard group were found in the complication rates (OR = 0.472; 97.2% CI= 0.250-0.890; p=0.009), length of stay (Mean Difference = -3.440 days; 97.2% CI=-6.803,-0.076; p=0.025) and post-surgical time until mobilization (Mean Difference = -10.557 hours; 97.2% CI=-17.278,-3.835; p=0.0005582). In meta-regression, inversed correlation was showed between the number of completed ERAS items and the readmission rate (p-value=0.021). No significant differences were found in other outcomes.




*[Meta-analysis results (I)]*




*[Meta-analysis results (II)]*

**Conclusion(s):** ERAS programs can improve the perioperative process of radical cystectomy, existing signs of reduction of the total number of complications and length of stay in hospital.

## 08AP09-1

### Assessment of unplanned postsurgical admission in the intensive care unit

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**Background and Goal of Study:** Comprehensive assessment of surgical patient needs to include a forecast and a plan of the needs that arise after surgery. It is necessary to establish criteria for identifying which patients who have undergone surgery need to be admitted in intensive care units (ICU); and which are subsidiary to be handled in the post-anaesthetic recovery unit (PACU). These criteria are: the associated comorbidity, the degree of surgical complexity and the risk of potentially planned complications.
Through the conduct of a study, reflect the unforeseen causes observed on admission to the postsurgical care unit.
**Materials and methods:** Observational, descriptive and crosscutting study. It took place in a secondary referral hospital from September to November 2015. Among the sample of 4236 patients treated on a programmed basis, the need to apply for critical care before surgery was dismissed in 3678 of them. 11 patients eventually needed to be admitted in one of the critical care units.
The information gathered includes: age, sex, associated comorbidity and anesthetic risk (ASA score), level of surgical complexity, perioperative hemodynamic, respiratory or neurological complications.
**Results and discussion:** According to the data obtained, 0.29% of patients who undergo surgery need to be admitted to a ICU unit on an unplanned basis. The variables connected to unplanned admission that we observed were: perioperative complications, among which the most common is intraoperative bleeding (27%), respiratory disorders (respiratory failure, aspiration and laryngeal spasm; 27%), ECG changes (9%), and increased unexpected surgical complexity in patients without associated condition (9%).
**Conclusion(s):** The results show that the main cause of unplanned admission to the postsurgical ICU is the occurrence of perioperative complications with hemodynamic or respiratory effects, followed by the unexpected increase in surgical complexity. The fact that the comorbidity variable is easier to plan, allows for a better screening and minimizes the number of patients that required unplanned admission to the postsurgical ICU. Therefore, surgical patients selection and distribution protocols are key to ensure a quality healthcare.

## 08AP09-2

### Preoperative disability and quality of recovery after elective surgery

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**Background and Goal of Study:** World Health Organization Disability Assessment Schedule (WHODAS)2.0 has recently been considered a clinically reliable instrument for measuring postoperative disability in surgical patients. We aimed to evaluate the influence of preoperative disability in recovery after surgery.
**Materials and methods:** An observational prospective study, approved by the institutional ethics committee, was performed in 209 patients scheduled for elective surgery. Patients over 18 years, undergoing non-cardiac, non-obstetric and non-neurological surgery under general anaesthesia admitted at Post Anaesthetic Care Unit (PACU) were included. Exclusion criteria: inability to give informed consent. Patients were evaluated for perioperative characteristics and Portuguese version of WHODAS was used to identify patients with disability (PWD), defined as a score of ≥25% on the questionnaire. Portuguese version of Post-operative Recovery Scale (PQRS) was applied at baseline and after surgery at minute 15(T15), 40(T40) and days 1(D1) and 3(D3), evaluating recovery in 5 domains: physiological(PD), nociceptive(ND), emotive(ED), activities of daily living(AD) and cognition(CD). Incomplete recovery (IR) was considered if patients did not return to baseline values or better for all questions. Portuguese version of the 15-item quality of recovery(QoR-15) was also applied 24 hours after surgery.The EQ-5D Scale and VAS, and Clinical Frailty scale were also applied at baseline. The Mann-Whitney test, Chi-square or Fisher's exact test were used for comparisons.
**Results and discussion:** All 209 patients completed WHODAS before surgery. From those 9,1% had disability. PWD had more frequently IR at T15 in ED( 82% vs. 54%, p=0.037) and ND(39% vs 8%, p<0,001), at T40 in ND( 39% vs. 7%, p<0,001), at D1 in ND( 33% vs 10%, p=0,003), PD( 83% vs. 40%, p=0.001) and at D3 in ND(39% vs. 9%, p=0.001).In CD, patients without disability presented more frequently IR at D1( 75% vs. 50%, p=0,02). Total median QoR-15 score at D1 was lower in patients with disability (p=0.021). PWD were more frail (p<0,001), had more problems in EQ-5D Scale domains and lower scores in EQ-VAS. PWD had higher ASA physical status(p=0,001).
**Conclusion(s):** PWD had more frequently IR in nociceptive domain of PQRS denoting important problems in recovery in all time frames. Accessing disability was able to provide significant data important for the understanding of quality of recover after anaesthesia.

## 08AP09-3

### Importance of temperature monitoring in minor surgical procedures - 200 patients: a prospective audit

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**Background and Goal of Study:** Unintentional hypothermia is common during surgical procedures, mostly due to impaired thermoregulatory control induced by anaesthesia. The goal of temperature monitoring is to maintain appropriate temperature during all anaesthetic procedures. Nevertheless, in short procedures with minimal surgical exposure, temperature monitoring is often neglected.
The aim of this study was to evaluate the temperature variation (TV) in patients submitted to minor surgical procedures.
**Materials and methods:** After Hospital Ethics Committee approval, a prospective audit was conducted including 200 patients submitted to minor surgical procedures at a tertiary hospital, between March to July of 2015. Gender, age, American Society of Anaesthesia Physical Status (ASA), Body Mass Index (BMI), type of anaesthesia, surgery duration, use of active warming and hospital length stay were collected. Tympanic temperature was monitored using Grado® thermometer (RM205V model), on five moments: Operating Room arrival (T1), after anaesthetic induction (T2), end of surgery (T3), Post Anaesthesia Care Unit arrival (PACU) (T4) and at PACU discharge (T5). ΔT2-T1, ΔT3-T2, ΔT4-T1, ΔT5-T1 and ΔT5-T4 were calculated. Results - Number, percentage, mean ± standard deviation (SD) and median (SPSS® v.22).
**Results and discussion:** 200 patients included (55% female); age ranging between 19 and 92 years old (median 61). ASA 1: 8%; 2: 69%; 3: 23%; 4: 1%. Mean BMI was 27,12 ± 4,23 Kg/m². 85% were submitted to general anaesthesia (GA), surgery mean duration was 55 ± 32 minutes. 25% (n=50) were actively warmed during surgery. Mean hospital stay 3,35 ± 3,28 days.
T1: 36,24 ± 0,51 ºC; T2: 36,01 ± 0,6 ºC; T3: 35,5 ± 0,68 ºC; T4: 35,33 ± 0,65 ºC; T5: 35,65 ± 0,56 ºC.
ΔT3-T2: -0,74 ± 0,56ºC, ΔT5-T1: -0,58 ± 0,51ºC and ΔT5-T4: 0,33 ± 0,43ºC.
Patients with perioperative heat loss (HL) ≥ 0,6ºC: 17% ΔT2-T1; 46% ΔT3-T2; 73% ΔT4-T1 (33% with HL between 0,6ºC and 1,0ºC and 40% with HL >1,0ºC), 52% ΔT5-T1 (38% with HL between 0,6ºC and 1,0ºC and 14% with HL >1,0ºC). 95% with HL ≤ 0,5ºC in ΔT5-T4.
**Conclusion(s):** This prospective audit suggests that even in minor surgical procedures, with minimal surgical exposure and with a short duration, there is an important heat loss. This prospective audit let us think about the importance of temperature monitoring and the necessity of develop and implement strategies to avoid HL in perioperative period.

## 08AP09-4

### Is parenteral iron-therapy a low cost alternative to allogeneic blood transfusion in total hip and knee replacement?

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**Background and Goal of Study:** Preoperative anaemia is a common condition among patients undergoing Total Hip and Knee Replacement (THKR) surgery, increases the risk of allogeneic red blood cells (RBC) transfusion and is associated with increased mortality and morbidity (1). Implementation of preoperative patient blood management (PBM) improve patient outcomes and lead to financial savings. Iron deficiency is one of the main causes of preoperative anaemia and its treatment is recommended with iron supplementa-

tion (2). Because of the limitations of oral iron therapy in patients scheduled for surgery, parenteral iron supplementation (PIS) should be preferred, although many patients will respond to oral iron. Efficacy of PIS in this group of patients was already demonstrated.
We aim to compare the costs of allogeneic RBC transfusions versus PIS in THKR in the perspective of implementation of a PBM program.
**Materials and methods:** In this retrospective study, we reviewed all the elective THKRs in our hospital during one year (2014/15), consisting of 246 patients. All reported P values are two-tailed, with a P value of 0,01 indicating statistic significance. Analyses were performed with SPSS software, version 22.
**Results and discussion:** Preoperative anaemia (World Health Organization criteria) was found in 9% of patients. Overall transfusion rate was 18% and 39% of patients with preoperative anaemia were transfused. Greater transfusion requirements were associated with lower preoperative haemoglobin ($p<0,01$), Patients with preoperative haemoglobin less than 12,6 +/- 1,1g/dl were more frequently transfused ($p<0,01$). A mean of 0,57 +/- 0,843 units of RBC were transfused in patients with preoperative anaemia. In Portugal, transfusion of one unit of RBC is estimated to cost €536 - €875 (3). Approximated costs with PIS are €430 - €501 per patient. This means that approximately €273 - €834 per patient with preoperative anaemia could have been saved if a PBM protocol existed.
**Conclusion(s):** We estimated that the savings in a year would be between €2,457 - €7,506. This excludes indirect costs like length of hospital stay and costs with potential hazards of allogeneic RBC transfusions. In a time were economics are becoming more important in health services, this could raise awareness of the importance of preoperative anaemia and PBM.
**References:**
1. Eur J Anaesthesiol. 2015 Mar;32(3):160-7
2. British Journal of Anaesthesia 106 (1): 13-22 (2011)
3. Acta Med Port 2013 Sep-Oct;26(5):487-489

## 08AP09-5

### Quality of recovery: comparing "Postoperative Quality of Recovery Scale" with "Quality of Recovery - 15"

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**Background and Goal of Study:** Quality of recovery (QoR) is an important postoperative outcome measure. Several tools have been developed to assess the multidimensional variables of QoR. The aim of this study was to compare two scales designed for QoR evaluation: Postoperative Quality Recovery Scale (PQRS) and Quality of Recovery - 15 (QoR-15).
**Materials and methods:** After approval by the institutional ethics committee, an observational, prospective study was performed in 206 patients scheduled for elective surgery. Patients included were older than 18 years, undergoing plastic, gynecologic, urologic and general surgery, under general anesthesia, admitted to the Post Anesthetic Care Unit (PACU). Exclusion criteria were: inability to give informed consent. Portuguese version of QoR-15 was applied before (D0) and 24 hours after surgery (D1). PQRS Portuguese version was applied at D0 and after surgery at minute 15 (T15) and 40 (T40), at day 1 (D1) and 3 (D3) evaluating recovery in five domains: physiological, nociceptive, emotive, activities of daily living and cognition. Recovery was defined as return to baseline values or better for all questions within each PQRS' domain. Poor quality of recovery (PQR) was defined as recovery in less than 2 domains at D1. The Mann-Whitney test, Chi-square or Fisher's exact tests were used for comparisons.
**Results and discussion:** A total of 182 patients were included in this study. Incidence of PQR was 13.2%. At D1 patients with PQR had lower median total QoR-15 score (106 vs 125, $p=0.001$). Considering each QoR-15 item, patients with PQR had lower median scores at 3 of them: able to look after personal toilet and hygiene unaided ($p=0.002$), able to return to work or usual home activities ($p<0.001$) and having a feeling of general well-being ($p=0.001$). PQR patients had a lower preoperative median total QoR-15 score (131 vs 138, $p=0.012$). Patients with recovery in less than 2 domains at T15 and at T40 had lower median QoR-15 scores at D0 (132 vs 145, $p<0.001$ and 129 vs 141, $p=0.019$, respectively). Patients with recovery in less than 2 domains at D3 had lower median QoR-15 scores at D1 (108 vs 126, $p=0.026$).
**Conclusion(s):** The PQRS and the QoR-15 have concordant results 24 hours after surgery and patients identified as having PQR with PQRS have lower scores in Qor-15.

## 08AP09-6

### Does body weight influences perioperative heat loss in minor procedures? - A prospective audit in 200 patients

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**Background and Goal of Study:** Perioperative thermoregulation is affected by body morphology, once redistribution of heat is smaller in obese patients because of the thick insulating fat layer that prevents dissipation of metabolic heat. These patients are most of the time vasodilated which reduce their core-to-peripheral temperature gradient. Our goal was to evaluate the relation between perioperative temperature variation (TV) and body weight (BW) in patients submitted to minor procedures.
**Materials and methods:** After Hospital Ethics Committee approval, a prospective audit was conducted including 200 patients submitted to minor surgical procedures (laparoscopic cholecystectomy, endoscopic urologic procedures, thyroidectomy, hernioplasty and minor proctologic surgery) at a tertiary hospital, between March to July of 2015. Gender, age, American Society of Anaesthesia Physical Status (ASA), Body Mass Index (BMI), type of anaesthesia, duration of surgery, use of active warming and hospital length stay were collected. Tympanic temperature was monitored using a Grado® thermometer (RM205V model), on five moments: Operating Room arrival (T1), after anaesthetic induction (T2), end of surgery (T3), Post Anaesthesia Care Unit arrival (PACU) (T4) and at PACU discharge (T5). ΔT3-T2, ΔT5-T1 and ΔT5-T4 were calculated. Results - number, percentage, mean ± standard deviation (SD), and median. Mann-Witney U test and Spearman correlation test were used ($p<0,05$) (SPSS® v.22).
**Results and discussion:** 200 patients included (55% female); age between 19 and 92 years old (median 61). ASA I: 8%; II: 69%; III: 23%; IV: 1%. 85% submitted to general anaesthesia (GA), duration of surgery 55 ± 32 minutes. 25% (n=50) actively warmed during surgery. Hospital length stay 3,35 ± 3,28 days. BMI 27,12 ± 4,23 Kg/m², 22% (n=44) obese (BMI≥30). T1: 36,24 ± 0,51 ºC; T2: 36,01 ± 0,6 ºC; T3: 35,5 ± 0,68 ºC; T4: 35,33 ± 0,65 ºC; T5: 35,65 ± 0,56 ºC. ΔT3-T2: -0,74 ± 0,56ºC, ΔT5-T1: -0,58 ± 0,51ºC and ΔT5-T4: 0,33 ± 0,43ºC. No significant relation was found between TV and BW during perioperative period. No difference between obese and non-obese patients in ΔT3-T2 ($p=0,52$), ΔT5-T1 ($p=0,38$) and ΔT5-T4 ($p=0,68$).
**Conclusion:** In our prospective audit we didn't identify relation between BW and heat loss during the perioperative period. We didn't find differences between obese and non-obese patients and heat loss. Our results are different from data published; more studies are needed to clarify our findings.

## 08AP09-7

### Incidence, predictors and outcomes of acute kidney injury after vascular surgery

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**Background and Goal of Study:** Acute kidney injury (AKI) after vascular surgery (VS) can affect 2-25% of patients. VS patients have many comorbidities that increase the risk of AKI. The aim of the study was to evaluate the incidence, predictors and outcomes of AKI after VS and compare it with VS AKI Predictive Score.
**Materials and methods:** The institutional ethics committee was obtained for this observational prospective study. We included all patients submitted to elective arterial vascular surgery between January and April 2015. Patients under 18 years old or in dialysis programme were excluded. AKI was defined as a rise of 0.3 mg/dl in postoperative creatinine. Descriptive analysis was performed and Student's-T, Mann-Whitney, Chi-square or Fischer's exact test were used. Univariate and multivariate logistic regression were done with calculation of an Odds Ratio (OR) and its 95% Confidence Interval. Hosmer-Lemeshow test for Goodness of fit and Area under the Receiver Operating Curve (AUROC) were also analyzed.
**Results and discussion:** We included 280 patients. The incidence of AKI was 23.2%. Patients with AKI had higher length of stay and mortality rate ($p<0.001$). Age, history of congestive heart failure (CHF), reduced functional capacity defined as MET<4, chronic kidney failure (CKF), *Diabetes Mellitus* with organ damage or insulin dependency, ASA physical status IV/V, Revised Cardiac Risk Index ≥2, hipocoagulation, pre-operative haemoglobin <10 g/dl, serum creatinine >1.8 mg/dL, serum urea >50 mg/dl or serum chloride <98 mEq/L, general anaesthesia, lower limb or high risk surgery and intraoperative

hypotension (minimum mean arterial pressure <55 mmHg) were significant in univariate analyses. Myocardial Infarction and sepsis were more frequent in patients with AKI (p<0.001). On multivariate analysis, CHF (OR 7.5, p<0.001), preoperative serum creatinine >1.8 mg/dL (OR 10.9, p<0.001) and serum chloride <98 mEq/L (OR 3.7, p=0.003), high risk surgery
(OR 2.6, p=0.025), sepsis (OR 2.5, p=0.022) and general anaesthesia (OR 4.2, p<0.001) were found to be independent predictors for AKI. AUROC was 0.81 compared to 0.69 of VS AKI Predictive Score.
**Conclusion(s):** Incidence of AKI after VS is considerably high resulting in increased mortality and morbidity. CHF, preoperative creatinine >1.8 mg/dL and serum chloride <98 mEq/L, high risk surgery, sepsis and general anaesthesia were found to be independent risk factors for AKI.

## 08AP09-8

### The incidence of "full stomach" in an elective fasted surgical population

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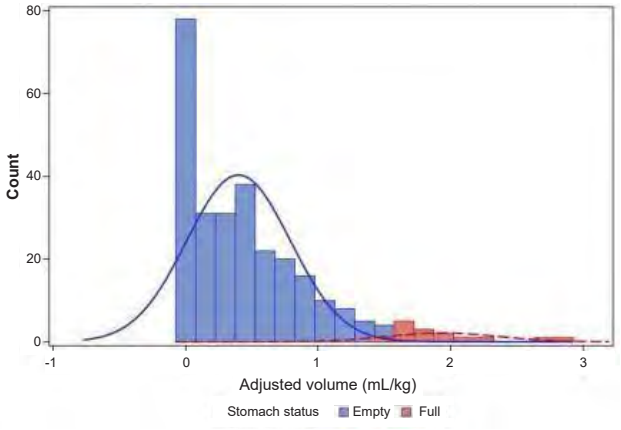
**Background:** Perioperative aspiration can lead to significant morbidity and mortality. Standard fasting periods may not be sufficient to ensure an empty stomach in all patients.
**Goal:** To investigate the incidence of "full stomach" (solid gastric content or >1.5 mL/kg of clear fluid)[1] as evaluated by bedside ultrasound in an elective surgical population at a community hospital.
**Materials and methods:** After IRB approval, we performed a retrospective single cohort study. An anesthesia departmental database containing information on preoperative gastric ultrasound examinations on non-obstetric patients was queried for the following data: demographic information, ASA class, comorbidities, type of surgery, fasting interval for fluid and solid, ultrasound examination results. The ultrasound examinations were performed following a previously described protocol.[2] Results were summarized using descriptive statistics.
**Results:** Four hundred and two patients (53.5 % males, age 47.9( 18.4) years, height 172 (9.8) cm, weight 76.4 (15.9) kg, BMI 25.7 (4.7) kg/m$^2$) were identified. Mean fasting times were 10.4 h for fluids and 13.7 h for solids. A "full stomach" was present in 21(5.2%) patients. Of those, 6 (1.5%) had solid content and 15 (3.7%) had > 1.5 mL/kg of clear fluid (fig.1). An "empty stomach" (≤1.5 mL/kg clear fluid) was documented in 361 (89.8%) patients while the exam was inconclusive in the remaining 20 subjects (5.0%). Of the patients with a "full stomach", only 5 had a recognized risk factor for prolonged gastric emptying (diabetes n=1, GERD n=2, Parkinson n=1, Antabuse n=1).




*[Fig 1. Distribution of Calculated weight adjusted volume by empty/full stomach]*

**Discussion and conclusion:** The results suggest that a small proportion of elective surgical patients present with "full stomachs" despite appropriate fasting intervals and no significant comorbidities. Bedside gastric ultrasound may help identify these cases and guide management. Larger population-based studies could better define the relative risk associated with specific patient factors.

**References:**
1. Van de Putte P, Perlas A. Br.J. Anaesth.2014;113(1):12-22.
2. Perlas A, Mitsakakis N, Liu L et al. Anesth Analg.2013;116(2):357-63.

## 08AP09-9

### Incidence and predictive value of postoperative Troponin elevation in high-risk patients undergoing major thoracic surgery

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**Background and Goal of Study:** Cardiac troponins are considered reliable biomarkers of myocardial injury in patients who undergo thoracotomy and lung surgery [(1)]. Troponin elevation has been associated with intrapericardial resections and pneumonectomies but the incidence reported and its predictive value largely varies upon series [(2,3)]. The aims of this study were to determine the frequency of postoperative troponin elevation following major thoracic surgery in high-risk patients and its correlation with the extension of the procedure and 30-day mortality.
**Material and methods:** As part of routine postoperative care for patients at high cardiac risk (≥65 years or <65 years with known cardiovascular pathology), we measured serum high-sensitivity Troponin I (TnI) levels (Siemens ADVIA Centaur) during the first two postoperative days in 117 consecutive patients undergoing major thoracic surgery. The TnI cut off used to define troponin elevation was the 99th percentile provided by our laboratory (TnI ≥0.04 ng/ml). Baseline clinical characteristics, perioperative parameters, and 30-day mortality were assessed in both groups.
**Results and discussion:** From January 2014 to October 2015, 117 high-risk patients underwent postoperative TnI monitoring after major thoracic surgery, of which 35 (25.7%) had a peak TnI ≥0.04 ng/ml on postoperative day 1 or 2. The frequency of TnI elevation was: pneumonectomy(3/5, 60%), lobectomy(26/70, 37.1%), wedge resection (5/26, 19.2%) or pleural resection(1/16, 8.3%) (P-value chi-squared 0.046). Active smoking was an independent factor for postoperative troponin elevation (P-value 0.028).No differences were found in age, sex or baseline clinical characteristics (including history of coronary artery disease) neither in perioperative parameters. Overall 30-day mortality was of 3/117(2.6%) and no difference was found between patients with or without postoperative troponin elevation (P-value 0.154).
**Conclusions:** In our study, 25.7% of high-risk patients undergoing major thoracic surgery showed postoperative troponin elevation, being more frequent in more extensive procedures.This elevation was not associated with a higher risk of early mortality, suggesting that may be regulated by other mechanisms other than myocardial ischemia.Further studies are needed to confirm this issue.

**References:**
1. Vikenes K et al. Int J Cardiol 2004; 96:403-7
2. Muley et al. Clin Lab 2011; 57:925-932
3. Lucrezioti et al. Rev Esp Cardiol 2007; 60:1159

## 08AP09-10

### Probable new horizons for cholesterol and lipoproteins

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**Background and Goal of Study:** Cholesterol represents the major constituent of cell membranes and it is in relative proportion to phospholipids, which largerly determines their physical properties. Total cholesterol, high density lipoprotein (HDL) and low density lipoprotein (LDL), as fractions of total cholesterol, are markers of cardiovascular-disease epidemiologic features, but their role as markers of nutritional status and influence on perioperative complications is yet to be understood.
This goal of the study was to evaluate perioperative levels of total cholesterol, HDL and LDL in patients with different nutritional status and their influence on surgical complication rate.
**Materials and methods:** A retrospective audit was carried out from clinical records of patients with radical cystectomy with urinary diversion between

January 2005 and January 2010. According to body mass index, patients were divided in two groups $BMI_1 \leq 22kg/m^2$ and $BMI_2 > 22kg/m^2$. Total cholesterol, HDL and LDL were measured preoperatively and on the fifth day after operation. Complications were defined as surgical complications that led to relaparatomy. The data was analyzed using Fisher's exact test and Mann-Whitney U test.
**Results and discussion:** During the study period 42 patients underwent radical cystectomy with urinary diversion. The age of patients in both groups was similar with average of 63,62±7,97 years old. There was not any statistically significant difference in the type of operation and pathohystological examination between the groups. There was statistical significance in the postoperative change of total cholesterol and LDL in both groups (Fisher's exact test: p=0,001 for cholesterol and p=0,001 for LDL). High density lipoprotein showed difference perioperatively just in the group of patients with lower BMI (p=0,001). Complications occurred more frequently in the group of patients with lower total cholesterol (p=0,013; p<0,05). The median LDL cholesterol value was lower in the group of patients with which surgical complications occurred (Me=2,75mmol/l) compared to the patients without complications (Me=2,4mmol/l).
**Conclusion(s):** Total cholesterol may be important biochemical parameter for nutrition and complication assessment. Further investigation should include more sensitive nutritional parameters to compare with cholesterol and lipoproteins.

## 08AP09-11

### Does Regional Anaesthesia Improve Outcomes in Myasthenia Gravis Patients? - A Retrospective Study

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**Background and Goal of Study:** Several anaesthetic techniques have been proposed for myasthenia gravis (MG) patients, although none has been proved to be better.[1] The aim of our study was to compare general anaesthesia (GA) and regional anaesthesia (RA) in patients with MG regarding perioperative outcomes.
**Material and methods:** An observational retrospective study was conducted between May 2005 and August 2015. Patients with MG submitted to surgeries under GA and RA were included. Patient's demographics and perioperative data were collected from medical records. Descriptive analysis was performed; Mann-Whitney U test, Fischer's exact test or Chi-square were used. Statistical differences were considered significant when p<0.05.
**Results and discussion:** A total of 50 patients were included corresponding to 68 surgeries: 17 under RA and 51 under GA. Patients submitted to RA were older than those submitted to GA (p=0.041). There were no differences in ASA physical status (p=0.08), body mass index (p=0.39) and duration of anaesthesia (p=0.83) between the two groups. Patients submitted to RA were predominately in stage I (69% vs 31%) and those submitted to GA had more often generalized form (78% vs 22%) (p=0.001). The RA group had longer LOS (p=0.016). None of the patients of LR group were admitted in ICU, while 25 patients of GA group were admitted.
Although patients from LR group had a mild form of disease, they were older and had longer hospital stay. This might be due to the type of procedure. The LR group consists of 11 patients, 6 of them was reoperated. Moreover, surgery was often skin grafts or related procedures, which often imply a longer hospital stay.
In this study 2 (2.9%) myasthenic crisis occurred, both after thymectomy under GA with use of NMB agents. There weren't relation with length of MG (p=0.391), LOS (p=0.215) and ICU stay (p=0.822).
**Conclusion(s):** ASA physical status and MG' grade didn't determine the anaesthetic management. In our study patients submitted to LR anaesthetia were older and had a longer LOS but had more often a localized form of disease.
Our results didn't allow us to conclude that one type of anaesthesia is superior to the other because of LR group were small and had important differences in relation to GA group.
**Reference:**
1. Acta Anaesthesiol Scand 2012; 56: 17-22

## 08AP09-12

### Postoperative fasting in adults and children: a survey of French practices

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**Background and Goal:** Postoperative fasting maybe a source of discomfort for patients but is important to reduce early vomiting and bronchial aspiration. While preoperative fasting guidelines are clearly established, few recommendations on the resumption of oral intake are available [1]. The aim of this study was to evaluate the French practices of postoperative fasting in adults and children after general anaesthesia.
**Methods:** A questionnaire was sent to anaesthesiologists registered on the mailing list of Société Française d'Anesthésie-Réanimation (SFAR). This included 13 questions related to the duration of postoperative fasting according to the airway control (intubation or laryngeal mask), in adult and paediatric patients ASA 1-3 scheduled for elective surgery without any surgical complication or difficulty for intubation. Patients of GUT surgery, cervical, ENT surgery and neurosurgery were not included.
**Results and discussion:** The results were collected from 755 responses (91.6% senior anaesthetists and 8.4% residents) from June, 2013 to January, 2014. Anaesthetists were practicing in University Hospital (38.5%), General Hospital (26.7%), or Private Hospital (34.9%). After extubation, the resumption of liquids while leaving the recovery room was allowed for children in 43.1% of the responders vs. 31.6% for adults (p <0.01). Two hours after extubation, 58.4% of the responders allowed the resumption of feeding in children vs. 43.9% in adults (p <0.001). After removing a laryngeal mask, the resumption of liquids while leaving recovery room was allowed for children in 55.1% of responders and for adults in 49.5% of responders (p <0.03). Two hours after removing a laryngeal mask, 71.5% of the responders allowed the resumption of feeding in children vs. 65.3% in adults (p <0.01). Seventy-eight percent of responders known that there are no French guidelines but 80% were not aware of the European recommendations. Finally, 87% of responders declare no institutional protocols in their hospital.
**Conclusion(s):** The resumption of liquids is faster than that of food in adults and children. Fasting is prolonged for some responders when adult patients were intubated compared to the use of a laryngeal mask. In children, whatever the management of upper airway, postoperative fasting is often shorter. Recovery protocols with minimized perioperative fasting may help to improve patient outcomes and streamline recovery.
**Reference:**
1. Eur J Anaesthesiol,28(2011):556-69

## 08AP10-1

### The clinical implication of perioperative D-dimer monitoring in open biliary surgery for obstructive jaundice

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**Background and Goal of Study:** Elevated D-dimer levels reflect the systemic activation of blood coagulation towards hypercoagulation and/or hyperfibrinolysis. In patients (pts) operated on for obstructive jaundice (OJ) most of triggering factors of coagulation are present, such as systemic biliary inflammatory response, malignancy, or surgical trauma. Little is known about the pattern and significance of D-dimer changes after surgery for OJ, which is the aim of our study.
**Materials and methods:** 105 consecutive adult patients undergoing open biliary surgery were included in a prospective, observational, descriptive study and were stratified as follows: with malignant OJ (group A, n=36), with benign OJ (group B, n=39), without OJ (group C, n=30) and with biliary inflammation (a casemix from groups mentioned above, group D, n=39). Plasma and whole blood samples were collected preoperatively and then on 1, 3 and 5 postoperative days. D-dimer (normal range 0-500 nmol/l) as well as PT, aPTT, AT III, F XIII, prothrombin fragment F1+2 were measured using conventional assays, ELISE, and automated coagulation analyzer "STA Compact". The between-groups comparisons and multiple correlations with total bilirubin (i.e. with OJ) and the other haemostatic parameters were calculated using OneWay ANOVA and stepwise multiple regression, respectively, at $\alpha = 0.05$

(SPSS version 19). Pts in groups A, B and D received only postoperative LMWH thromboprophylaxis.
**Results and discussion:** In groups A, B and D, there were abnormal increases of D-dimer levels preoperatively, with a peak at 1st postoperative day and subsequent decreases (without reaching normal range) at 3rd and at 5th postoperative days, with the statistical significance only in group B. Compared with group C, the changes were the greatest in group A, followed by group D and group B. There were moderate significant correlation among D-dimer and PT, aPTT, AT III, F XIII, prothrombin fragment F1+2 changes (0,3<R<0,7). There were no cases with clinically overt massive bleeding or thromboembolic events perioperatively.
**Conclusion(s):** The changes in D-dimer levels are not isolated, but go with the changes in other haemostasis parameters (such as PT, aPTT, AT III, F XIII, prothrombin fragment F1+2). In cases of preoperative elevated D-dimer and more than one abnormalities in the above laboratory tests, it could be assumed non-symptomatic DIC or pre-DIC and considered the implementation of Heparin/LMWH preoperatively as well.

## 08AP10-2

### The recognition of anesthesiologists among the patients of surgical wards in southeastern Poland

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**Background and Goal of Study:** The role and professional qualifications of anesthesiologists seem not to be properly recognized in society. The aim of this study was to assess patients' knowledge about anesthesiologists' qualifications. The other objective was to evaluate the level of patients' satisfaction regarding perioperative care.
**Materials and methods:** This survey-study was performed among 200 patients of surgical wards in the southeastern Poland. The study protocol consisted eleven close-ended questions concerning patients' knowledge about anesthesiologists and the assessment of preanesthetic visit and the conduit of anesthesia. Additional information obtained during the study included patients' demographic data, level of education, kind of surgery, as well as type of hospital and ward. The survey was conducted students of Medical University of Lublin, who were not involved in medical procedures
**Results and discussion:** 74% of the respondents were aware of the fact that anesthesiologists are physicians. Patients with high or secondary education more often recognized an anesthetist as a doctor than people with basic one (Pearson Chi2=11.66649, p=0.00862). Patients were offered to choose the type of anesthesia in 59.5% of cases. This opportunity was more frequently given to patients in tertiary (university) hospitals (Pearson Chi2 =17.59179, p=.00734). A preanesthetic visit reduced anxiety of 67,5% of patients. The quality of anesthesia was satisfactory according to 90,5% of patients.
**Conclusion(s):** The patients' knowledge about professional qualifications of anesthesiologists was similar to the data found in the literature.
**References:**
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Swinhoe CF, Groves ER. Patients' knowledge of anaesthetic practice and role of anaesthetists. Anaesthesia. 1994;49:165-6.

## 08AP10-3

### Sugammadex vs. neostigmine for reversal of neuromuscular blockade: a Bayesian non-parametric model of simulation of meta-analysis based on the results of a systematic review

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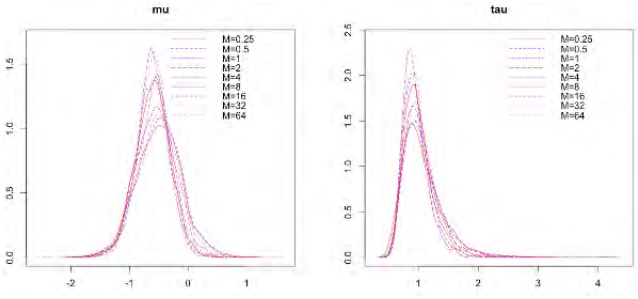
**Background and Goal of Study:** The usual frequentist models for meta-analysis specify a normal distribution for the true effects, but, sometimes, the effect distribution is not normal due to be skewed or non-parametric, causing an increase in false positives.
From this perspective, we decided to reevaluate the results of a recent meta-analysis[1] on the use of sugammadex versus neostigmine as reversor of neuromuscular blockade.
**Materials and methods:** The data for the construction of the model was extracted from the systematic review PROSPERO 2015:CRD42015016755[1], a meta-analysis of 17 trials of 1553 participants that studies the differences in muscle weakness, adverse effects, nausea and vomiting following administration of sugammadex or neostigmine. For each outcome, the result of the studies was simulated 4000 times based on their original result and its standard error, applying a conditional Dirichlet model and modifying its accuracy (M) exponentially from 0.25 (very non-parametric) to 64 (very parametric), building 9 models. For each model, we calculate the value of log RR and the probability that the actual RR was less than 0. The plausibility of each model was assessed by calculating the Bayes factor.
**Results and discussion:** Results are described in Figure 1.

| | *Log RR (Probability of RR < 1) for Bayesian simulated model (M = 2^x where x = from -2 to 5)* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Outcome* | M = 0.25 | M = 0.5 | M = 1 | M = 2 | M = 4 | M = 8 | M = 16 | M = 32 | M = 64 |
| Overall signs of muscular weakness | -0.494<br>91.44% | -0.479<br>91.17% | -0.526<br>93.27% | -0.562<br>95.77% | -0.577<br>97.27% | -0.597<br>97.63% | -0.595<br>98.40% | -0.604<br>98.77% | -0.603<br>98.93% |
| Minor signs of muscular weakness | -0.666<br>97.33% | -0.670<br>97.23% | -0.648<br>97.23% | -0.653<br>97.90% | -0.613<br>97.23% | -0.582<br>97.40% | -0.558<br>98.23% | -0.526<br>97.83% | -0.508<br>98.20% |
| Major signs of muscular weakness | -0.440<br>83.71% | -0.466<br>84.97% | -0.501<br>86.17% | -0.518<br>87.57% | -0.554<br>88.94% | -0.610<br>91.24% | -0.641<br>92.50% | -0.686<br>94.30% | -0.668<br>92.94% |
| Adverse events | -0.229<br>84.61% | -0.226<br>84.71% | -0.232<br>84.67% | -0.236<br>85.10% | -0.248<br>87.04% | -0.260<br>88.50% | -0.277<br>91.64% | -0.282<br>93.47% | -0.290<br>95.67% |
| Nausea | 0.139<br>28.09% | 0.133<br>28.52% | 0.120<br>31.16% | 0.085<br>36.42% | 0.036<br>44.49% | -0.016<br>54.55% | -0.077<br>65.54% | -0.105<br>72.18% | -0.124<br>75.54% |
| Vomits | -0.121<br>64.71% | -0.119<br>65.51% | -0.128<br>66.71% | -0.117<br>65.91% | -0.118<br>66.64% | -0.105<br>66.04% | -0.069<br>60.18% | -0.031<br>55.35% | 0.003<br>50.55% |

*[Figure 1]*

Results of parametric models were similar to original meta-analysis, but were worse in non-parametric models, not reaching 95% in adverse events. However, it confirmed the strength of the result about minor signs of muscular weakness.




*[Figure 2]*

Bayes factor showed non-parametric models were more plausible in all outcomes.
**Conclusion(s):** Data from meta-analysis should be viewed with caution, because there it could be non-parametric data and it can produce false positives.
**Reference:**
1: Abad-Gurumeta A et al. A systematic review of sugammadex vs neostigmine for reversal of neuromuscular blockade. Anaesthesia. 2015;70:1441-52.

## 08AP10-4

### Comparison of hypoxic test and breath-holing test in evaluation of peripheral chemoreflex sensitivity

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**Background and Goal of Study:** Increased sensitivity of peripheral chemoreceptors (SPCR) reflects the degree of activation of the sympathetic nervous system and the degree of changes in cardiorespiratory reflex regulation. These disorders can be a cause of hemodynamic instability and potential perioperative anesthetic complications. Thus, the evaluation of this parameter can be very useful in the assessment of the cardiorespiratory system. Nowadays, the primary method of evaluating the sensitivity of the peripheral chemoreflex is a hypoxic test. However, its technical complexity and the high incidence of hypoxia do not allow its use in routine practice. The goal of the study was to compare the breath-holding test with hypoxic test in the evaluation peripheral chemoreflex sensitivity.
**Materials and methods:** We conducted a prospective study in 21 healthy volunteers (12 men and 9 women), all of them were 22 years old, and body mass index was 25±2. The breath-holding test was performed by measuring of voluntary breath-holding duration (BHD) after a 2/3 of maximal inspiration. The end of breath-hold was determined by a palpation of contraction of the diaphragm. After 15 minutes the hypoxic test was performed. During the test, several (up to 7) short (lasting 5-40 s) administrations of pure nitrogen into inspired air were performed to achieve falls in SpO2 with maximal desaturation varying from 65 to 85 % (conditions of short hypoxemic hypoxia).The study was approved by the Internal Review Board of the Kuban State Medical University.
**Results and discussion:** The mean transient hypoxic ventilatory response was 0.329±0.067 $min^{-1} \times (\%Sao2)^{-1}$, the mean breath-holding duration was 46±21 sec. Both tests were reproducible with a mean coefficient of variation of 22% and 19%, respectively. There was a strong inverse correlation between the results of the transient hypoxic and breath-holding tests when data were compared by linear regression analysis (r = 0.68, P = 0.03). There were no any adverse respiratory or hemodynamic effects during breath hold.
**Conclusion(s):** Breath-holding test may be useful and safe test of evaluating of peripheral chemoreflex sensitivity
**Reference:**
Paleczny B., Niewiński P. Age-related reflex responses from peripheral and central chemoreceptors in healthy men Clin Auton Res. 2014; 24(6): 285-296.
**Acknowledgements:** The reported study was funded by RFBR, according to the research project No. 16-34-60147 mol_a_dk.

## 08AP10-5

### Identifying the position of the right atrium to align pressure transducer for CVP

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**Background and Goal of Study:** Central venous pressure (CVP) is important in perioperative cardiovascular monitoring and regulation. CVP is targeted for control of, e.g., hemorrhage, right ventricular and renal function. CVP contributes to mean systemic filling pressure, heart and volume efficiency. To obtain a valid measurement the pressure sensor must be at the height of the right atrium (RA).
This study aimed at developing an electromagnetic (EM) 3D identification of the RA from external sensors in anatomical landmarks or internal sensor in a blinded lumen of the CV catheter (CVC) as an aid to the precise measurement of CVP.
**Materials and methods:** Twenty patients post major surgery were examined in the recovery room. EM sensors were placed at landmarks (hidden under shirt), in the CVC and on pressure sensor. Members of staff were asked to align pressure sensor to presumed height of RA by spirit level (SL). Patients were supine, tilted and rolled as dictated by nursing routines. Exact 3D coordinates were recorded by a planar field type EM generator (Northern Digital Inc) and dedicated software. Measurements totaled 239. Staff estimate of RA position was compared to position indicated by external and internal sensors and related to monitor displayed CVP by vector analysis as sensors were in two coordinate systems at an angle corresponding to elevation of head rest. Agreement of staff and sensor RA positioning was assessed by Bland & Altman-plots and influence of tilt and roll on agreement by ANOVA.
**Results and discussion:** Assessment of agreement between staff and external & internal sensors showed a bias of -0.76 & 1.17 mmHg. Corresponding limits of agreements (LOA) were 8.2;-8.6 & 11.8;-9.4 mmHg. The internal sensor on average showed values 2 mmHg above external sensors. ANOVA resulted in a p=0.065 for differences between no roll vs any roll and p=0.37 between tilt<>20°, see figure. There was no interaction between tilt and roll in creating differences.
**Conclusion:** CVP must be kept low and within narrow limits to be useful. LOA spanned 16.8-21.3 mmHg and thus would make the measurement useless in goal directing perioperative therapy. The EMG technique may aid in obtaining a more exact CVP with the sensor placed in the CVC and recognition of the anatomical relationship between SVC and RA.
**Acknowledgements:** David Wilkes, Vygon, Ecouen, France is warmly acknowledged for developing and providing the multilumen CVCs with one lumen blinded.

## 08AP10-6

### Perioperative anesthetic management of patients with Gaucher disease: a 10-year retrospective survey

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**Background and Goal of Study:** Gaucher disease, a rare lysosomal storage disorder caused by an enzyme deficiency, results in hepatosplenomegaly and consequent cytopenia as well as lung and skeletal pathology is some cases and more rarely, neurological involvement. Enzyme replacement therapy is standard management for visceral signs in symptomatic patients.
**Methods and results:** In the past decade (retrospective chart review) 86 surgeries in 59 patients were performed at our clinic, of which two patients had the neuronopathic form, not carrying a N370S mutation on at least one allele. Mean Severity Score Index was 11.7 points (range 0-27 when 30 is the worst possible score) indicative of moderate involvement. One third of the patients underwent orthopedic surgeries and one-eighth obstetric.
**Discussion:** In addition there were 20 invasive procedures (colonoscopies and gastroscopies) that did not require anesthesia. 50% f the surgeries employed general anesthesia with no complications noted. Similarly, various surgeries employing regional anesthesia (spinal, epidural and peripheral nerve block) were uneventful. Because of concurrent anemia (12%) or thrombocytopenia (20%), 26% of patients received blood products during or after the surgery. Most cases only required standard monitoring but in 20%, monitoring including inserting a peripheral arterial line for directs pressure measurements and blood sampling. Tromboelastography (TEG) is an important part of the perioperative management of these patients secondary to potential hypocoagulation state.
Conclusion The good results we have seen are in great measure because of improvement in hematological parameters because of enzyme therapy. In patient with platelets >50,000/mm3 and normal TEG regional anesthesia is feasible. No airway problems as a result of Gaucher diseases were recognizing.
**References:**
Hip arthroplasty in patients with Gaucher disease. Lebel E et al. Blood Cells Mol Dis. 2011 Jan 15;46(1):60-5.
Thromboelastography as a Surrogate Marker of Perisurgical Hemostasis in Gaucher Disease. Ioscovich A et al. Clin Appl Thromb Hemost. 2015 Mar 27

## 08AP10-7

### Effectiveness and complications in the use of ultrasound guidance for vascular cannulation among 3rd year residents

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**Background:** In the literature there is controversy regarding the effectiveness of ultrasound guidance during peri-operative vascular cannulation[1]. We observed among third year anesthesiology residents if the use of an ultrasound

(US) guided technique for arterial and jugular venous catheterization leads to faster insertion times, higher success rates and fewer complications compared to the blind palpation or landmark technique.
**Methods:** With approval of local medical ethic committee we observed the insertion by third year residents of the radial artery catheter and central venous catheter (CVC) in patients undergoing cardiac surgery. The residents were free to choose the cannulation technique. The study endpoints were the success rate considered as numbers of attempts (each attempt being defined as a new skin puncture), time required for insertion and the immediate complications (ischemia, bleeding, hematoma, pneumothorax and vasospasm).
**Results:** A total of 34 patients and six residents were included in the study. The arterial catheterization was successful on the first attempt in 9/11 patients in the US guided group and in 21/23 patients in the palpation group. The mean insertion time was 2.6 vs. 2.1 min, respectively. Two complications occurred with the palpation technique, 1 with the US guided one. The CVC was inserted on the first attempt in 16/16 patients in the US group and in 12/18 patients in the landmark group. Overall, 6 complications (3 arterial punctures and 3 local hematomas) occurred in the landmark technique group (80%), while no complication occurred when US was used ($p<0.05$).

| | Landmark technique (n=18) | US guided (n=16) |
|---|---|---|
| Sex male/female | 13/5 | 11/5 |
| Age (yr) | 62,9 ± 14 | 65,4 ± 15,4 |
| Height (cm) | 177,4 ± 6,8 | 175,8 ± 8,4 |
| Weight (kg) | 79,9 ± 11,4 | 80,1 ± 17,5 |
| | Palpation technique (n=23) | US guided (n=11) |
| Sex male/female | 19/4 | 5/6 |
| Age (yr) | 65,4 ± 15,1 | 61,7 ± 14,6 |
| Height (cm) | 177,1 ± 8,7 | 174,3 ± 4,9 |
| Weight (kg) | 81 ± 14,4 | 80,7 ± 13,1 |

*[Patient's characteristics]*
**Conclusion:** For radial arterial catheterization the use of US did not improve clinical practice compared to blind palpation among 3rd year anaesthesia residents. On the contrary for central venous access US was associated with reduced complications and increased success rate compared to blind palpation or landmark technique.
**Reference:**
1. Wan-Jie Gu, et al. Critical care 2014;18:R93

## 08AP10-8

### Evaluation of the efficacy of dexmedetomidine for prevention of catheter related bladder discomfort in early postoperative period

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**Background and Goal of Study:** Catheter Related Bladder Discomfort (CRBD) has started to gain recognition as a problem in early postoperative care unit (PACU) which causes significant distress to the patient.It's incidence is said to be 58%.Dexmedetomidine has also shown anti muscarinic activity (M3 receptor) in animal studies.[14] Hence the potential of Dexmedetomidine to reduce bladder contractility via M3 muscarinic receptor antagonism and α-2 receptor agonism, apart from its concomitant therapeutic benefits, like sedation and sympatholysis, in a postoperative set up.
**Materials and methods:** This is a prospective, randomized, double-blind, placebo controlled trial.Total 110 voluntary kidney donors were enrolled for the study, out of which 100 patients completed the study. The study therefore consisted of 100 consecutive adults (18-60 yr) of ASA physical status I and II patients of either sex, planned for laparoscopic donor nephrectomy.
The Control Group: received 20 ml normal saline IV infusion over 15 min and the study (Dexmedetomidine ) Group: received dexmedetomidine 1 mcg/kg made in 20 ml NS as iv infusion over 15 min.
Main outcome measures: The incidence and severity of CRBD was recorded as primary endpoint for both groups at different time intervals.
**Results and discussion:** The incidence of CRBD on arrival at PACU was 18% in Dexmedetomidine group compared to 42% in control group ($P<0.05$). The incidence of CRBD was reduced in Dexmedetomidine group in at 0, 2 and 4 hr ($P<0.05$). The severity of CRBD was reduced in Dexmedetomidine group in at 0, 2, 4 and 12 hr ($P<0.05$).
**Conclusion(s):** Dexmedetomidine 1mcg per kg administered intravenously to patients 30 minutes before extubation reduces the incidence and severity of CRBD in early postoperative settings with no adverse effects.
**References:**
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## 08AP10-10

### Is isolated angioedema in the perioperative setting a symptom of allergy? A retrospective single-centre study

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**Background:** Angioedema is a potentially life-threatening condition in the perioperative setting. Causes of angioedema are numerous and the pathophysiology not fully understood. Angioedema presenting with urticaria or other allergy symptoms may be IgE mediated, but the role of allergy in angioedema presenting as the only symptom is unknown.
The Danish Anaesthesia Allergy Centre (DAAC) is the national reference centre for investigation of perioperative allergy. Patients are systematically investigated for all drugs and substances they were exposed to prior to the reaction using skin tests, specific IgE tests and provocation tests. A relevant clinical reaction is confirmed as allergy by a positive provocation test or two other positive test results.
The aim of this study was to examine whether allergy could be identified in patients referred to DAAC with angioedema as the only symptom of suspected perioperative allergy.
**Methods:** A retrospective review of the DAAC database included 421 patients (58% women, median age 56) investigated for suspected perioperative allergy in the period 2004-2015. Symptoms i.e. other skin symptoms urticaria/unclassified rash or flushing/itch; respiratory and circulatory symptoms were correlated to the result of allergy investigation in patients presenting with angioedema.
**Results:** In total 132 of 421 (31%) reacted with angioedema (70% females). Of these 113 (86%) had one or more additional symptoms suggestive of allergy e.g. skin (urticaria/unclassified rash), respiratory or circulatory symptoms. In this group allergy was confirmed in 44 (39%) and this was comparable to the proportion of confirmed allergy in the total cohort 158 of 421 (38%). The remaining 19 (14%) patients presented with angioedema with no other allergy symptoms or only minor transient skin symptoms (flushing/itch). Of these, only two had allergy confirmed on investigation: one had elevated tryptase at the time of reaction and the other was on antidepressants, which potentially inhibit allergic skin symptoms due to an antihistamine effect. In four of the 19 patients (21%) concomitant ACE inhibitor treatment could explain the reactions and none of these had allergy.
**Conclusion:** Angioedema presenting as the only symptom in the perioperative setting, with normal serum tryptase at the time of reaction in patients not on medication that inhibits skin symptoms, is unlikely to be due to allergy. ACE inhibitors may cause non-allergic angioedema in the perioperative setting.

## 08AP10-11

### The effects of irrigation solution temperature in transurethral surgeries

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**Background and Goal of Study:** The aim of this study was to determine the effects of the temperature of irrigation fluid on core body temperature in patients undergoing transurethral resection (TUR) in urology.
**Materials and methods:** After the approval of the local ethical committee (KOU KAEK 2013/26) and written consent of patients, 70 patients between the age of 50-85 with an ASA score I to III, which were scheduled for TUR surgery,

were enrolled in this prospective randomized study. Patients were randomized and assigned to one of two groups.
Group I consisted of 35 patients who received room temperature irrigation fluid during surgery;
Group II consisted of 35 patients whose procedure was performed with warmed irrigation fluid. The core body temperature was determined with the use of an infrared tympanic thermometer and was expressed as the change from baseline. Additional information including demographical data, amount of irrigation and intravenous (iv) fluids used, length of operation, hemodynamic parameters during the intra-peri-postoperative period and patient satisfaction scores for thermal comfort were recorded.
**Results and discussion:** There were no statistically significant differences between groups for demographical data, amount of irrigation and of iv fluids used, length of operation and hemodynamic parameters. The temperature drops at the 90th minute ($p=0,001$) and at the end of the operation ($p=0,008$) were lower in Group II, which were statistically significant. Patient thermal comfort scores were significantly higher in Group II ($p=0,018$).
**Conclusion(s):** We concluded that the use of warm irrigation fluids during TUR reduces the degree of temperature drop, which helps to prevent hypothermia.

## 08AP11-1

### The effects of A118G gene mutation on the fentanyl dose needed for postoperative analgesia in the patients undergoing gynecological malignant tumor surgery

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**Background and Goal of Study:** The opioids are very useful drug for the purpose of perioperative analgesia, but there are highly individual differences in their effects. One of the reasons why such individual differences appears is the polymorphism of the opioid receptor $\mu$1 (OPRM1) called A118G. The wild type of this SNP is A, but there is a thing mutating in G. This variation has been reported in the Westerners at a prevalence of only 10%, but it is recognized to approximately 50% of Asians with an especially high prevalence in Japanese individuals.
In a prior study that was carried out in Europe and the United States, no accurate comparison among the three groups (AA, AG, and GG) was performed. In Asia, there was no report on the prevalence of this variation in individuals with malignant tumors or undergoing highly invasive surgery. Therefore, we divided Japanese subjects who underwent malignant tumor surgery into three groups according to their genotype, and compared the amount of fentanyl needed for postoperative analgesia.
**Materials and methods:** Forty-five women, aged 20-80 yrs, of ASA I~III, and who were scheduled to undergo gynecological malignant tumor surgery under general anesthesia were enrolled. After the approval of the Ethical Review Board, written informed consent was obtained from the patients. For postoperative analgesia, bilateral transversus abdominis plane blocks were performed preoperatively, and patient-controlled analgesia using intravenous fentanyl was provided. After surgery, saliva of patients was collected from the patients, and the genotype was analyzed by PCR. Patients were divided into three groups by genotype: AA group, AG group, and GG group.
**Results and discussion:** There were no significant differences in background and in the frequency of post-operative nausea and vomiting as a side effect among the three groups. The total fentanyl doses (mean±SD) on the third day were 1,896±832 $\mu$g in the AA group, 2,572±974 $\mu$g in the AG group, and 3,167±1366 $\mu$g in the GG group. There was a significant difference between the AA group and the GG group ($p<0.05$). Individual fentanyl requirements were varied in the AG group.
**Conclusion(s):** There is a significant difference in the amount of fentanyl needed for post-operative analgesia following malignant tumor surgery in based on the type of A118G gene mutation. The causes of individual differences within the same gene type should be elucidated in a future study.

## 08AP11-2

### Continuous transverse abdominis plane block vs thoracic epidural anesthesia in patienrs undergoing to radical cystectomy in a enhanced recovery after surgery program: a retrospective cohort study

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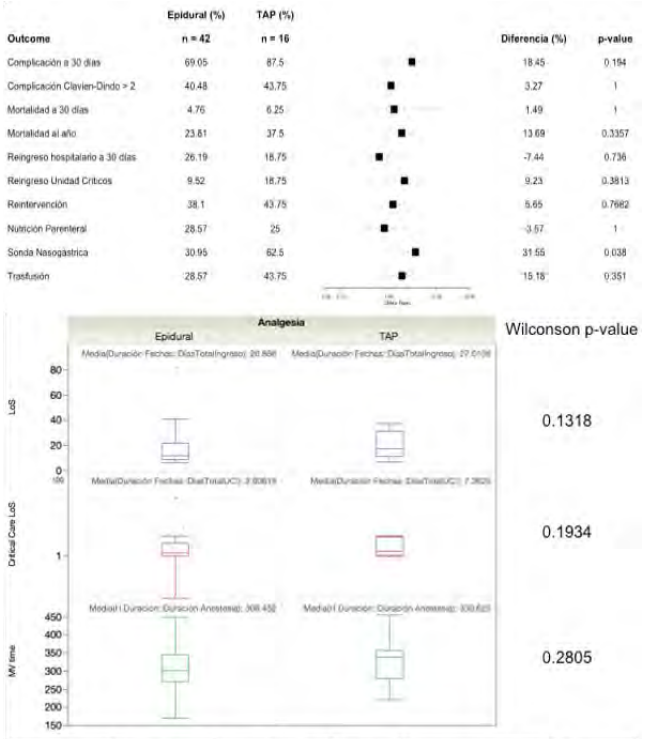
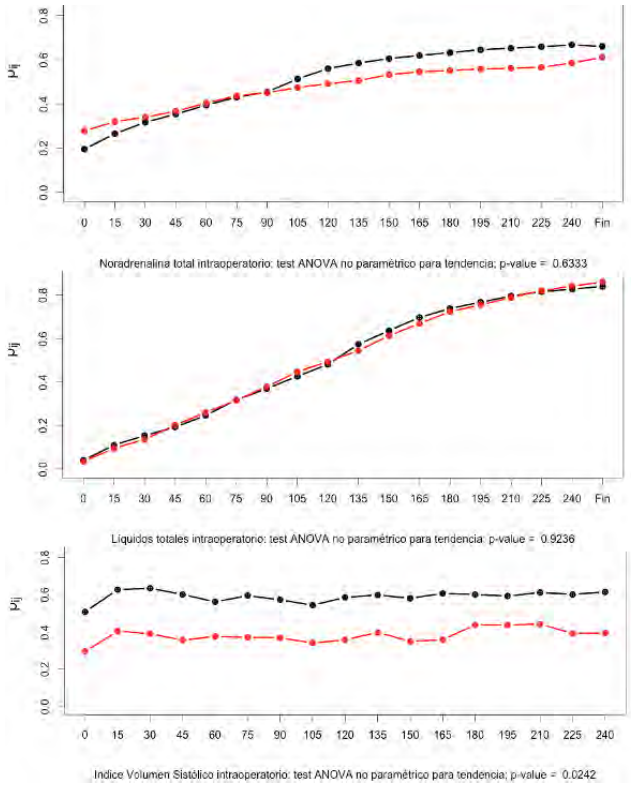
**Background and Goal of Study:** TAP block has been described as an alternative to thoracic epidural for abdominal surgery. The objective of our study is to compare the results of both techniques in an ERAS environment of a major abdominal surgery, as radical cystectomy.
**Materials and methods:** Retrospective analysis of patients undergoing ERAS radical cystectomy by open approach since June 2011 until December 2014. A continuous TAP Block (Bolus: Levobupivacaíne 0.25% 10 ml and Perfusion: Levobupivacaíne 0.1% - 8 ml/H by side) was implemented in those patients where the anesthesiologist was not able to implement a thoracic epidural catheter (3 attempts in different spaces or 20 minutes). Patients underwent general anesthesia under desflurane, remifentanil and rocuronium. Patients were monitored by an arterial line and a transesophageal doppler in order to maintain MAP <70 mmHg and maximize stroke volume using norepinephrine and fluid challenges.
Morbidity, mortality, readmission, reintervention, length of stay, need of nasogastric tube, parenteral nutritions, infunded fluids, noradrenaline, hemodynamic variables and analgesia quality were compared between groups. Discrete variables were assessed by Fisher's test and continuous ones by Wilcoxon's test. Trends were asessed by ANOVA test for non-parametric data.
**Results and discussion:** No differences in VAS score were found between groups. Increased complications and hospital stay was detected in TAP group, but not statistically significant. TAP group needeed significative more use of nasogastric tube during postoperative period.




| | Analgesia | Q25 | Median | Q75 | Wilcoxon's p |
|---|---|---|---|---|---|
| 24 h VAS | Epidural | 2 | 3 | 4 | 0.168 |
| | TAP | 1 | 1 | 3 | |
| 48 h VAS | Epidural | 1.75 | 2.5 | 3.25 | 0.816 |
| | TAP | 1 | 2.5 | 3.5 | |

*[Figure 1: Discrete, continuous and VAS results]*

Although both groups had similar needs of intraoperative drugs and fluids, epidural group had better cardiac performance.




*[Figure 2: Noradrenaline, fluidtherapy & SVI trends]*

**Conclusion(s):** Thoracic epidural provides better cardiovascular performance against TAP and may improve postoperative outcomes in ERAS environment.

## 08AP11-3

### The analgesic effect of nefopam with fentanyl at the end of laparoscopic cholecystectomy

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**Background and Goal of Study:** Nefopam is a centrally acting analgesic that is used to control pain. The aim of this study was to find an appropriate dose of nefopam that demonstrates an analgesic effect when administered in continuous infusion with fentanyl at the end of laparoscopic cholecystectomy.
**Materials and methods:** Ninety patients scheduled for laparoscopic cholecystectomy were randomly assigned to receive analgesia with fentanyl alone (50 $\mu$g, Group 1, n = 30), or with fentanyl in combination with nefopam 20 mg (Group 2, n = 30) or in combination with nefopam 40 mg (Group 3, n = 30) at the end of surgery. Pain and side effects were evaluated at 10 minutes, 30 minutes, 1 hour, 2 hours, 6 hours, and 12 hours after arrival in the post-anesthesia care unit (PACU).
**Results and discussion:** Pain was statistically significantly lower in Groups 2 and 3 than in Group 1 at 10 minutes, 2 hours, and 6 hours after arrival in the PACU. Nausea was statistically significantly lower in Group 2 than in Groups 1 and 3 at 10 minutes after arrival in the PACU. shivering was statistically significantly lower in Groups 2 and 3 than in Group 1 at 10 minutes after arrival in the PACU.
**Conclusion(s):** Nefopam is a drug that can be safely used as an analgesic after surgery, and its side effects can be reduced when fentanyl 50 $\mu$g is injected with nefopam 20 mg.
**References:**
1. Saghaei E, Moini Zanjani T, Sabetkasaei M, Naseri K. Enhancement of antinociception by co-administrations of nefopam, morphine, and nimesulide in a rat model of neuropathic pain. Korean J Pain 2012; 25: 7-15.
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## 08AP11-4

### Reduction of chronic post-surgical pain with ketamine (ROCKet) pilot trial

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**Background:** Persistent post-surgical pain (PPSP) is very common, occurring in 12% patients after major surgery.[1] Ketamine is a non-selective potent NMDA antagonist commonly used as a second or third line agent for refractory acute postoperative pain. However, its effect on the development of PPSP remains uncertain. A recent Cochrane Review concluded that ketamine was the only agent with evidence of a potential benefit in preventing PPSP.[2] We conducted a pilot study for a large Phase 3/4 multicentre randomized trial.
**Materials and methods:** With local ethics approval, 80 adult patients at 3 public hospitals were randomized to receive a double-blind infusion of either ketamine (0.5 mg/kg pre-incision, followed by 0.25 intra- & 0.1 mg/kg/hr post-operative for 24 hours), or placebo. Inclusion criteria were elective abdominal or thoracic surgery involving an incision of at least 8 cm (including thoracoscopy, breast surgery & inguinal herniorrhaphy). Exclusions included age > 85, history of illicit drug use and pre-existing chronic pain. The primary endpoint was the incidence of new persistent wound pain at 4-6 months, using a telephone follow-up design involving validated questionnaires (m-BPI, EQ-50, NPQ, WHODAS, Kessler K-10) [1]. Secondary endpoints included pain severity, depression & quality of life assessment, opioid consumption, side effects and safety data.
**Results and discussion:** 13 out of 75 (17.3%) surviving patients reported the presence of PPSP at 4-6 months (5/36 in control arm, 8/39 in treatment arm, RR = 1.48, p = 0.45 on $X^2$ test). Compared with previous large studies [1], median VAS scores for average pain in the previous 24 hours were low (median VAS [IQR] = 10 [0 to 10]//100). However, 2 patients in each group reported their worst pain in previous 24 hours at VAS ≥ 3/10 at 4-6 months. On logistic regression, PPSP presence strongly predicted depression (K-10 score median 16 vs 11, $p$ = 0.001) and disability (WHODAS score median 5.5 vs 1.0, $p$ = 0.012).
**Conclusion:** The trial protocol was successfully piloted and a large randomized double-blind trial is practical. Power analysis estimates that 4,000 patients would be required to demonstrate a 25 % reduction in incidence of PPSP.
**References:**
1. Chan M, et al. Pain. 2011;152(11):2514-20;
2. Chaparro *et al*. Cochrane Database of Systematic Reviews 2013, 7: CD008307

## 08AP11-5

### Comparison between ketamine and tramadol for pain management after major upper abdominal surgery

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**Background and Goal of Study:** Patient Controlled Analgesia (PCA) with intravenous morphine is commonly used to provide analgesia after major upper abdominal surgery. However, in this case intravenous morphine is not always sufficient as a monotherapy strategy. In this study we aimed to compare the efficacy of ketamine versus tramadol in the control of postoperative pain in patients receiving PCA morphine after major upper abdominal surgeries.
**Materials and methods:** In this single blind, prospective, randomized controlled trial, 42 adults patients**,** undergoing elective major upper abdominal surgery under general anaesthesia were included. Patients were allocated to receive either ketamine (load dose of 0.5 mg/kg followed by a continuous infusion of 0.12 $mgkg^{-1}h^{-1}$ up to 48 postoperative hours) (Ketamine group, n=21) or tramadol (load dose of 1 mg/kg followed by a continuous infusion of 0.2 $mgkg^{-1}h^{-1}$ up to 48 postoperative hours) (Tramadol group, n=21) in addition to their standard postoperative analgesia which consisted of PCA-morphine. Postoperative data collection included morphine consumption, VAS scores at rest and mobilization and side effects during the first 48 postoperative hours after the set of the morphine pump.
**Results and discussion:** There were no significant differences in patient demographic and intraoperative data among the two groups. Morphine consumption measured at 48 hours postoperatively revealed a significant difference between the two groups. Tramadol group had significantly less total morphine consumption during the first 48 postoperative hours [28.905 (16.504)mg vs 54.524, (20.846) mg, ($p<0.001$)] and presented significantly lower VAS scores at rest and mobilization ($p<0.05$) than ketamine group. No statistical difference was recorded between the two groups ($p>0.05$) regarding postoperative cough, sedation, hallucinations, pruritus, urine retention, postoperative nausea and vomit. However, patients in ketamine group reported dry mouth more frequently than patients in tramadol group ($p=0.032$).
**Conclusion(s):** Postoperative administration of tramadol was superior to ketamine because significantly reduced opioid consumption and pain scores in patients receiving PCA morphine after major upper abdominal surgery.

## 08AP11-7

### Lower opioid consumption after total knee replacement by computer controlled cooling

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**Background and Goal of Study:** Pre- and postoperative cryotherapy (PCT) after total knee replacement (TKR) is a well-established approach in pain management. Physiological cooling induces a vasoconstriction, thus preventing from oedema and inflammation and reduces pain perception, resulting in analgesia.
Currently two different methods are used: the classic cooling pads and the recently invented computer controlled cooling system (CCS). CCS controls temperature continuously and is associated with a lower rate of side effects. So far there is no clear evidence of the effectivity between different techniques of PCT on the postoperative pain in TKR due to a lack of well-performed clinical trials. In 2012 Rashkovska found a reduction of the opioid consumption as well as the postoperative pain of patients receiving a CCS.
However, methodical haziness of this study impedes a clear conclusion and therefore the clinical evidence is challenged[1]. Hence we initiated our study to investigate the postoperative opioid consumption and elucidate possible benefits of CCS.
**Materials and methods:** In this monocentric double blind randomized controlled trial patients undergoing a TKR were randomized into a CCS group and a control group treated with conventional cooling bags and ice water. Pain in rest and movement was measured by using the visual analogue scale (VAS). The cumulative morphine consumption was quantified via the readout of the patient controlled analgesia (PCA).
**Results and discussion:** In our study 51 patients were enrolled. Age, height and weight were comparable in the CCS and control group. While there was no difference between both groups in the pain in rest ($p=0.36$) and in movement ($p=0.21$) by evaluating the VAS, CCS group showed a significant lower cumulative hydromorphone consumption ($p=0.04$).
**Conclusion(s):** This study shows that CCS lowers postoperative opioid consumption and therefore indicates a better pain management of patients with TKR. These beneficial effects could improve the recovery process and furthermore accelerate mobilization after the operation.
**Reference:**
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## 08AP11-8

### Post-operative stepping and post-operative pain following abdominal surgery

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**Background and Goal of Study:** The assessment of postoperative recovery has developed from a single measurement at a single point in time to measurements of multiple variables at multiple time points. Recent assessment tools aim to target the right patients at the right time by detecting specific deficits in their recovery trajectories. (1) The aim of the present study was to retrospectively analyze the correlation between two parameters for postoperative recovery - the objective parameter of number of steps performed by patients undergoing major abdominal surgery and the subjective parameter of reported pain.
**Materials and methods:** Data from 59 patients, ages 57±15 years’ old, undergoing abdominal surgery were retrospectively analyzed. The number of steps performed in POD1, POD2 and POD3 was measured using a pedometer (Tractivity™). Pain scores were retrieved from the patients nursing charts. The highest value in each one of the nurses’ 8 hours shifts was used for further analysis.
**Results and discussion:** ASA physical status was 1 in 4 patients, 2 in 29 patients and 3 in 26 patients. The number of patients reported no pain or mild pain (pain scores 0-3) was 27 (46%), 42 (71%), 44 (74%) in POD1, POD2 and POD 3, respectively. The number of steps performed was 896±1,302 (n=59), 3,153±3,673 (n=59) and 2,936±2,484 (n=46), in POD1, POD2 and POD 3, respectively. In both parameters differences were between POD2 and POD1 ($p<0.001$) but not between POD3 and POD2. In POD1 patients with no pain or mild pain stepped 1,164±1,458 steps while patients with moderate or severe pain stepped 386±760 steps ($p=0.017$), in POD2 values were 3,487±3,775 vs. 1,736±1,874 ($p=0.02$), and in POD3 2,626±3,312 steps vs. 3,012±3,247 steps ($p=0.71$). The data suggests that while in POD1 and POD2 the objective parameter of number of steps performed by patients may be related to the magnitude of reported pain, in POD3 these two parameters may represent different aspects of patients’ recovery.
**Conclusions:** According to this preliminary study, patients undergoing major abdominal surgery with no pain or mild pain stepped more then patients with moderate or severe pain in POD1 and POD2 but not in PD3. The use of these parameters for the assessment of post-operative recovery should be further assessed.
**Reference:**
Bowyer AJ, Royse CF. Anaesthesia 2016 Jan; 71 Supp; 1:72-2.

## 08AP11-9

### Pre-operative fibrinogen levels are predictive of blood loss in total hip replacement surgery

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**Background:** Fibrinogen is considered an essential part of the clotting cascade, crucial for the formation of the fibrin polymer. Studies have shown that low levels of fibrinogen are associated with increased blood loss and packed-red blood cells (PRBC) units transfused during surgery. Improving pre-operative fibrinogen levels could potentially reduce blood loss and the consumption of hemoderivatives. In this study, it was analyzed whether pre-operative levels of fibrinogen could predict peri-operative blood loss and PRBC transfusion in total hip replacement surgery (THR).
**Materials and methods:** A retrospective analysis of hemotherapeutic practice in elective THR performed at our hospital was conducted. Due to lack of data only 82 out of a total of 168 patients were included. Pre-operative fibrinogen and hemoglobin (Hb) levels were correlated with the post-operative hemoglobin in the first 48 hours, the hemoglobin fall (pre-operative hemoglobin minus lowest hemoglobin) and the number of PRBC units transfused. The study also includes characterization of the study population.
**Results and discussion:** Mean age of the patients in this study was 64±13 years-old, with 44,6% females; 8,4% were ASA 1, 67,5% were ASA 2 and 22,9% were ASA 3. Half the cases underwent surgery with neuroaxial techniques. None of the patients had known coagulopathy or thrombocytopenia. Fibrinogen levels were categorized in the following groups: <200 mg/dL (3,6%), 200-300 mg/dL (37,3%), 300-400 mg/dL (49,4%) and >400 mg/dL (8,4%). The mean Hb fall was 3,74±1,68 g/dL with 50% of the patients needing transfusion with an average of 1,8±1,9 units of PRBC. The statistical analysis was performed using SPSS Statistics 21.0. A positive correlation was found between fibrinogen levels <300 mg/dL and the hemoglobin fall (p=0,022), applying Mann-Whitney test. Also according to these results, older patients (> 65 years-old) (p=0,05) and a higher ASA classification (p=0,002) were associated with lower pre-operative fibrinogen levels.
**Conclusion:** In THR surgery, a higher fibrinogen threshold might be adequate to reduce peri-operative blood loss. Also older patients or patients with higher ASA physical status classification might be at risk of having lower fibrinogen. Therefore, routine pre-operative dosing of fibrinogen in these patients might be valuable. Implementation of protocols regarding pre-operative blood management can improve outcomes by reducing both blood loss and the need of transfusion.

## 08AP11-10

### Age influences perioperative temperature variation. Myth or fact? - A prospective audit

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**Background and Goal of Study:** Advanced age has been recognized as a risk factor for perioperative heat loss. Thermoregulatory responses are decreased mostly due to altered regulation of peripheral blood flow in the setting of reduced microcirculation. The aim of this study was to evaluate the relation between age and perioperative temperature variation (TV).
**Materials and methods:** After Hospital Ethics Committee approval, a prospective audit was conducted including 200 patients submitted to minor surgical procedures (laparoscopic cholecystectomy, endoscopic urologic procedures, thyroidectomy, hernioplasty and minor proctologic surgery) at a tertiary hospital, between March to July of 2015. Gender, age, American Society of Anaesthesia Physical Status (ASA), Body Mass Index (BMI), type of anaesthesia, surgery duration, use of active warming and hospital length stay were collected. Tympanic temperature was monitored using a Grado® thermometer (RM205V model), on five moments: Operating Room arrival (T1), after anaesthetic induction (T2), end of surgery (T3), Post Anaesthesia Care Unit arrival (PACU) (T4) and at PACU discharge (T5). ΔT3-T2, ΔT5-T1 and ΔT5-T4 were calculated. Results - Number, percentage, mean ± standard deviation (SD), and median. Spearman correlation test was used (p<0,05) (SPSS® v.22).
**Results and discussion:** 200 patients included (55% female); age between 19 and 92 years old (median 61). ASA 1: 8%; 2: 69%; 3: 23%; 4: 1%. Mean BMI was 27,12 ± 4,23 Kg/m². 85% were submitted to general anaesthesia (GA), surgery mean duration was 55 ± 32 minutes. 25% (n=50) were actively warmed during surgery. Mean hospital length stay 3,35 ± 3,28 days.
T1: 36,24 ± 0,51 ºC; T2: 36,01 ± 0,6 ºC; T3: 35,5 ± 0,68 ºC; T4: 35,33 ± 0,65ºC; T5: 35,65 ± 0,56 ºC. ΔT3-T2: -0,74 ± 0,56ºC, ΔT5-T1: -0,58 ± 0,51ºC and ΔT5-T4: 0,33 ± 0,43ºC.
ΔT3-T2 was statistically related with age (r=-0,21; p=0,002). ΔT5-T1 and ΔT5-T4 were not related with age (p=0,07 and p=0,54 respectively).
**Conclusion(s):** We observed that heat loss was more pronounced during the surgery procedure (T3-T2) in this prospective audit study. Looking our study results it seems that TV is negatively related with age during the surgery procedure (T3-T2). The implementation of strategies to avoid heat loss is critical.

## 08AP11-11

### Predictors of bleeding in radical prostatectomies

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**Background and Goal of Study:** Surgical resection remains a critical component of optimal treatment for many solid tumors. Radical prostatectomy (RP) is an effective curative treatment for higher grade and advanced stage disease.1 During RP, patients lose large amounts of blood and may therefore require blood transfusions.2
The aim of this study is to analyze possible predictors of bleeding in RP.
**Materials and methods:** Retrospective analysis of patients undergoing open RP in a central hospital during 2014. The variables analyzed were: age, comorbidities, ASA (American Society of Anesthesiology) classification, preoperative analytical values, the size of the prostate, Gleason score, surgical time and intraoperative blood loss. Statistical analysis are performed using SPSS Statistics® 23, percentages were used for categorical variables; average with standard deviation (SD) or median with quartiles for nominal variables, depending on the normality tests. The Kruskal-Wallis, Mann-Whitney U tests and Spearman's correlation were performed according to the characteristics of the variables and considered statistically significant a p-value <0.05.
**Results and discussion:** In total 114 open RP were performed. Patients had a mean age of 64.7 years (SD 6.7). With respect to age (p=0.287), comorbidities and ASA classification (p=0.255), there was no statistically significant difference with the intra-operative blood loss. Between intra-operative bleeding and hemoglobin (p=0.365), creatinine (p=0.172) and preoperative prostate-specific antigen (p=0.057) there were no statistically significant differences. The preoperative International Normalized Ratio (INR) was related in a statistically significant way with the intra-operative bleeding (p=0.001). Between Gleason score and blood loss there were no statistically significant differences (p=0.493). Intraoperative blood loss was related significantly with the size of the prostate (p=0.020) and the duration of surgery (p=0.007).
The introduction of laparoscopic techniques may result in smaller wound, less bleeding, fewer infections, as well as a shorter length of hospital stay.3
**Conclusion(s):** Radical prostatectomy can result in significant blood loss.2 The optimization of patients with voluminous prostates, preoperative INR, and duration of surgery is important to reducing bleeding.
**References:**
1. Clin Genitourin Cancer 2015;13(3):e173-81
2. Korean J Urol. 2014;55:102-5
3. Eur Urol. 2015;67(4):660-70

## 08AP12-1

### Helium postconditioning induces RISK pathway activation in cardiac tissue of rats

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**Background:** Helium postconditioning (HePoc) is known to mimic anaesthetic conditioning and to prevent damage from myocardial infarction making it a promising clinical approach for treating ischaemia/reperfusion injury (I/R). Helium preconditioning (HePre) has been related to cardioprotective pathways including the RISK pathway with effector kinases ERK1/2, PKCε, AKT and PI3K [1].
We here hypothesize that HePoc induced cardioprotection is mediated through activation of the RISK pathway.
**Methods:** Animal experiments were performed in accordance with the Guide for Care and Use of Laboratory Animals (1996) and approved by the Academic Medical Center's animal ethics committee (DAA102650). Tissue was obtained from experiments previously published [1]. Male Wistar rats (n=7, each group) were subjected to 25 min of cardiac ischemia, followed by 15 min of reperfusion (I/R15). The HePoc groups underwent I/R plus 70% helium (He) during reperfusion (IR+He15). Sham animals received surgical treatment without I/R (Sham). At the end of each protocol blood and hearts were retrieved. The tissue was obtained from the area at risk (AAR) and the non-area at risk (NAAR) and processed for western blot analyses. Phosphorylation was used to determine kinase activation.
**Results:** Protein analyses revealed increased phosphorylation levels of AKT after 15 minutes of HePoc in the ischemic and in the non-ischemic tissue (AAR p=0.018; NAAR p=0.038; both vs. I/R15). ERK1 and ERK2 both showed increased activation after I/R compared to Sham (AAR, ERK1: p=0.038, ERK2: p=0.001). However HePoc treated animals showed even higher phosphorylation of ERK1/2 (AAR, both, p=0.022 vs. I/R15). In the NAAR ERK1/2 showed decreased phosphorylation after ischemia protocols for both, I/R15 (ERK1/2: both p=0.001) and I/R+He15 (ERK1: p=0.001; ERK2 p=0.002). Activation of PI3K and PKCε was not altered by I/R or HePoc in AAR and NAAR tissue.
**Conclusion:** These results suggest that 15 min HePoc activates RISK pathway kinases ERK1/2 and AKT, which could play a key role in production of cardioprotection.
**References:**
1. Pagel PS et al. Anesthesia and Analgesia 2007
2. Oei GT et al. Mol Med 2014

## 08AP12-2

### Rosuvastatin potentiates pro-angiogenesis and enhanced liver regeneration in a rat model of massive hepatectomy

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**Background and Goal of Study:** Partial hepatectomy (PH) is the standard surgical approach in removal of macroscopic liver parenchymal disease and transplantation of liver lobes is the ultimate therapy to cure the end-stage liver disease. Derangement of liver function or development of nonregenerative liver after massive hepatectomy or liver transplant carries extensively high postoperative mortality.
Therefore, it is essential to develop perioperative management to improve the regeneration of remnant lobes and attenuate hepatic ischemia-reperfusion injury (IRI) during PH or transplantation. Since HMG-CoA reductase inhibitors (statins) have been shown to mediate pleiotropic cytoprotective effects during IRI and enhance vasculogenesis, this study investigated the effect of rosuvastatin in the regenerative process of liver following PH.
**Materials and methods:** *Sprague-Dawley* rats were randomly assigned to receive oral placebo or rosuvastatin (20 mg/kg/d) in chow for 2 weeks. The animals were anaesthetized and 70% PH was performed. Liver mass and serum/tissue biochemistries were analyzed 7 days after PH. The regenerative liver tissues were biopsied and examined for liver proliferation index.
**Results and discussion:** The liver growth ratio was significantly increased in rats treated with rosuvastatin (0.72±0.10 vs 0.59±0.09, P=0.02). Serum level of monocyte chemoattractant protein (MCP)-1 was reduced following rosuvastatin therapy. The expressions of pro-angiogenic factors (VEGFR-2 and hepatocyte growth factor) and hepatic proliferative index (interleukin-6 and PCNA) were significantly upregulated in liver remnant of rosuvastatin-treated rats.
Furthermore, immunohistochemical analysis confirmed the increased tissue expression of PCNA+/Ki67+ hepatocytes in these animals.
**Conclusion(s):** Treatment with rosuvastatin attenuated the systemic inflammatory reaction and enhanced the regenerative response in the remnant liver by enhancement of tissue angiogenesis and proliferation of hepatocytes. Our results suggest that perioperative use of statins may serve a pharmacologic therapeutic to improve hepatic regeneration, particularly in parenchymal liver diseases such as steatosis.

## 08AP12-5

### Propofol protects oxidative stress-induced COS-7 cell death by induction of autophagy

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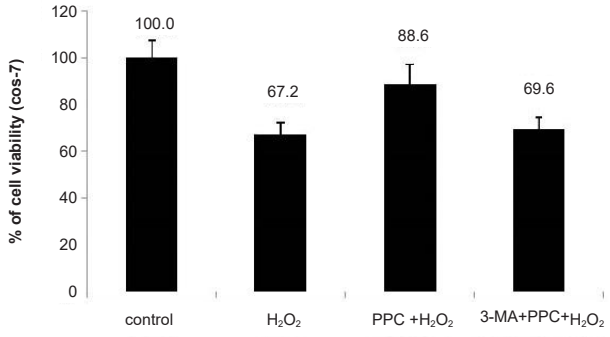
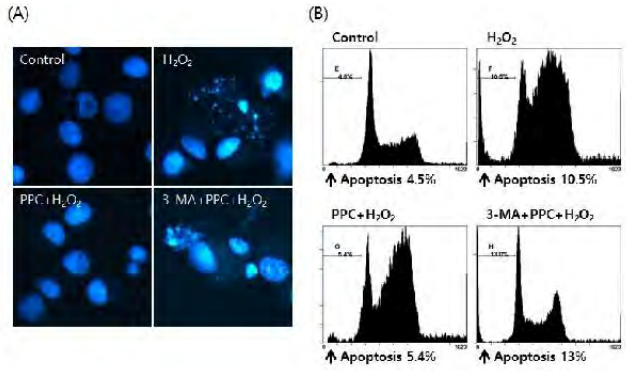
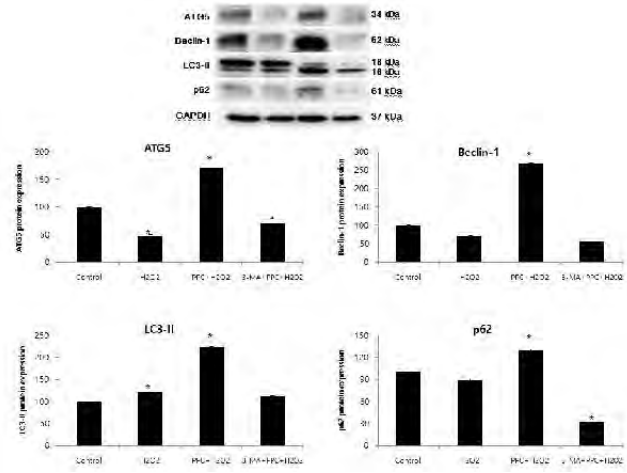
**Background and Goal of Study:** In oxidative stress, reactive oxygen species (ROS) production contribute cellular dysfunction and cell apoptosis. And autophagy is though the mechanism for decreasing ROS concentration and oxidative damage. Propofol presents antioxidant properties. So in this study, we investigated whether the propofol preconditioning protects cell damage from hydrogen peroxide-induced oxidative stress and influences on cellular autophagy.
**Materials and methods:** The groups were randomly divided into the following groups: Control; cells were incubated in normoxia (5% $CO_2$, 21% $O_2$ and 74% $N_2$) without propofol, hydrogen peroxide ($H_2O_2$); cells were exposed to 24 h $H_2O_2$ (400$\mu$M), propofol preconditioning (PPC)+ $H_2O_2$; cells pretreated with propofol were exposed to $H_2O_2$, 3-Methyladenine (3-MA)+PPC+ $H_2O_2$; cells pretreated with 3-MA (1mM) 1 h and propofol were exposed to $H_2O_2$. Cell viability was determined with MTT reduction. Apoptosis was determined by Hoechst 33342 staining. Relation with autophagy was detected with western blot analysis.
**Results and discussion:** Cell viability decreased significantly in $H_2O_2$ group and which was improved by propofol preconditioning. Propofol effectively decreased $H_2O_2$-induced COS-7 cell apoptosis. However, 3-MA inhibited the protective effect of propofol at cell apoptosis. In western blot analysis, autophagy related proteins were increased in PPC+$H_2O_2$ group compared.




*[Fig. 1]*




*[Fig. 2]*




*[Fig. 3]*

**Conclusion(s):** This study suggests that propofol preconditioning has protective effect on $H_2O_2$-induced COS-7 cell death, which is mediated by autophagy activation.

## 08AP12-6

### Arterial and plethysmographic variables as predictor of changes in cardiac output during pneumoperitoneum

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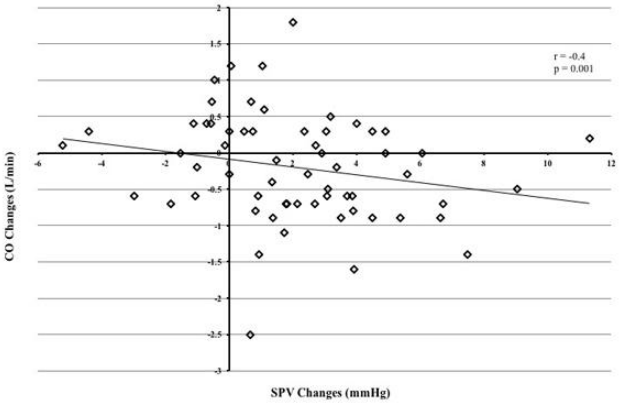
**Background and Goal of Study:** Laparoscopic surgery is associated with hemodynamic changes related to pneumoperitoneum (PnP). Respiratory induced arterial waveforms variables including systolic pressure variation (SPV), pulse pressure variation (PPV), as well as plethysmographic waveform variation (PWV) have been shown to predict cardiac output (CO) response to changes in preload. The goal of the study was to examine whether waveform variables either predict or correlate with cardiac output (CO) changes caused by PnP.
**Materials and methods:** The study was IRB approved. Patients scheduled for elective laparoscopic surgery who required continuous direct BP monitoring in sinus rhythm were eligible. Heart rate (HR), blood pressure (BP), as well as arterial and plethysmographic waveforms were recorded before and after the application of PnP (15 mmHg). SPV, PPV, PWV and delta pulse oxymetry plethysmographic amplitude (dPOP) were measured and calculated offline [1]. CO, cardiac index (CI), stroke volume (SV) and stroke volume index (SVI) were simultaneously measured using non invasive cardiac output monitor (NICOM, Cheetah Reliant, Cheetah Medical (UK) Limited, Maidenhead, Berkshire, UK).
**Results and discussion:** Sixty three patients were studied. There were no changes in BP and HR following PnP. CO decreased from 5.8 ± 1.4 to 5.6 ± 1.4 L/min (p = 0.05) following PnP. Statistically significant correlation was found between changes both in SPV and PPV, and between changes in CO (Pearson correlation coefficient r = -0.4; p = 0.001 and r = -0.3; p = 0.02 for SPV and PPV respectively) (Fig. 1). Changes in CO were not consistent: In 20 patients CO decreased by 10% or more after PnP of 15 mmHg. There was no difference in baseline arterial and plethysmographic variables between patients who decreased CO following PnP and those who did not.




*[Figure 1. Correlation between SPV and CO changes]*

**Conclusion(s):** Although there is correlation between changes in CO and arterial and plethysmographic waveforms variables following PnP, waveform variables at baseline cannot predict CO changes. Further studies needed for evaluating other mechanisms involved in CO changes during PnP.
**Reference:**
Pizov R et al. Anesthesiology 2010; 113:83-91

## 08AP12-7

### Impact of two different anaesthesia methods and duration of surgery on the activation of HHV-6 and HHV-7 infection in relation to changes in system

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**Background:** Beta-herpesviruses HHV-6 and HHV-7 are highly prevalent among healthy individuals. After primary infection, HHV6 and HHV-7 persists in the host and is detectable in multiple tissues, including cells of immune system. Reactivation is common in a state of immunosupression and is associated with severe clinical manifestations and increased mortality.
**Objectives:** Objective of study was to detect the impact of regional and general anaesthesia and duration of surgery on the status of HHV-6 and HHV-7 infection.
**Materials and methods:** 89 patients divided in study group (n=58) and control group (n=31). Patients of study group underwent free flap surgery (avg 5.7 h), patients of control group-short-term plastic surgery (avg. 43.3 min). 35 of study group patients underwent general (GA) and 23 patients regional (RA) anaesthesia. In control group 16 patients received GA, but 15 patients RA. Polymerase chain reaction had been used for the detection of HHV-6 and HHV-7 DNA sequences in peripheral blood cells and plasma.
The presence of viral DNA in peripheral blood cells was a marker of latent viral infection, in plasma, marker of active viral infection. Blood samples for the detection of the presence and activity status of viral infection were collected from patients before and 10 days after surgery. Total number of lymphocytes and CD4+, CD8+, CD16+, CD38+ cells were detected before and after the surgery.
**Results:** In the study group we detected the statistically significantly frequent ($p>0.05$) activation of HHV-6 and HHV-7 infection after surgery with GA, whereas with RA activation frequency was not statistically significant ($p<0.05$). In the control group, any statistically significant changes were detected irrespective of anaesthesia method applied. Comparing the total number of lymphocytes before and after surgery we found statistically significant decrease in the number of lymphocytes after surgery in the study group with GA ($p=0.01$), no statistically significant difference was found in patients with RA ($p=0.25$).

No changes had been detected in control group irrespective of anaesthesia applied. Decreased of total lymphocyte count after the surgery in study group patients with GA was statistically significantly associated with the activation of HHV-6 and HHV-7 infection (p=0.04).
**Conclusion:** Our study results suggest that duration surgery and general anaesthesia is associated with changes in immune system leading to activation of HHV-6 and HHV-7 infection.

## 08AP12-8
### The MAC-BIS50 of desflurane during tetanic stimulation

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**Background:** Intraoperative awakening is one of the complications which should be avoided. The minimum alveolar concentration of volatile anesthetics is an important factor in the suppression of biological response to nociceptive stimulation. A bispectral index (BIS) monitor is valuable for the maintenance of appropriate sedation; however, the minimum alveolar concentration (MAC) of desflurane at which the BIS index does not exceed 50 during nociceptive stimulation has never been reported. In this study, we investigated the MAC of desflurane during nociceptive stimulation (MAC-BIS50-tetanus).
**Method:** This study was approved by the ethics committee at Tsukuba University Hospital. The patients undergoing scheduled operation were recruited to this study, and written informed consent was obtained from all of them. The patients who had psychological disease and received sedatives were excluded. Anesthesia was induced with sevoflurane and 60% of nitrous oxide in 40% of oxygen and air. After the administration of rocuronium, a supra-glottic device (LMA or igel) was introduced. Then, administration of nitrous oxide and sevoflurane was then terminated, and we confirmed that the pre-determined end-tidal concentration of desflurane maintained for 10 minutes. The neuromuscular monitoring was used as a nociceptive stimulator; the altitude of the stimulation was 80 mA for 10 seconds, which is reported to be equal to skin incisional pain in the ulnar nerve. The BIS index was recorded every 10 seconds for 1 minute from beginning 1 minute after the stimulation. We defined the average of 6 BIS values as the BIS index for each patient. The MAC-BIS50-tetanus was determined using Dixon's up-and-down method.
**Result:** A total of 20 adult patients (aged from 31 to 65 years) were registered in this study. The MAC-BIS50-tetanus of desflurane was 4.27% (95%CI: 4.15 - 4.39%) in adult patients.
**Conclusion:** The MAC-BIS50-tetunus of desflurane was 4.27% (95%CI: 4.15 - 4.39%). When the end-tidal concentration of desflurane is 4.27 %, the BIS index is suggested to exceed 50 in half of the patients during nociceptive stimulation.

## 08AP12-9
### The effect of nicardipine on surgical pleth index during thyroidectomy under desflurane anaesthesia: a prospective randomized controlled trial

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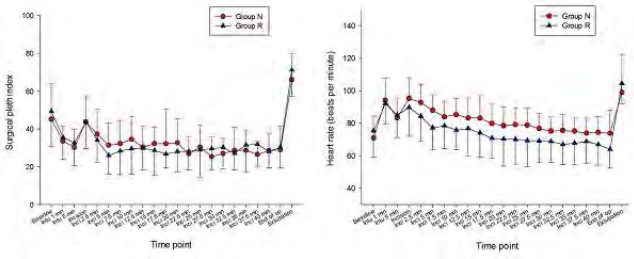
**Background and Goal of Study:** The effectiveness of surgical pleth index (SPI) for managing proper analgesia during anaesthesia has been demonstrated in many studies. Especially, SPI could differentiate haemodynamic action of a β-blocking agent (esmolol) from analgesic action of remifentanil. However, its effectiveness has not yet been proven in cases using a vasodilator including nicardipine. We hypothesized that SPI would be higher in patients receiving nicardipine than in those receiving remifentanil during thyroidectomy under general anaesthesia.
**Materials and methods:** Forty patients undergoing thyroidectomy were assigned randomly to receive nicardipine (group N;n=19) or remifentanil (group R;n=21). Anaesthesia was induced with propofol 2 mg/kg, fentanyl 1 μg/kg and rocuronium 0.6 mg/kg and maintained with desflurane/nitrous oxide 50% in oxygen to keep BIS at 40-60. The infusion of nicardipine or remifentanil was started before first incision and adjusted to keep mean blood pressure (MBP) within ±20% from the preoperative value. SPI, BIS, end-tidal desflurane concentration (EtDES), MBP and heart rate were recorded at 2.5 min intervals during surgery. Extubation time, recovery time (time to reach a modified Aldrete score of 10) and adverse events at post-anaesthesia care unit (PACU) were recorded.
**Results and discussion:** Patients' characteristics were comparable between the groups. Trend of SPI, BIS, EtDES and MBP were comparable between the groups during surgery, although heart rate was significantly higher in group N than group R (P=0.03, Fig. 1).




*[Fig. 1. Trend of SPI and heart rate]*

Extubation time, recovery time and incidence of nausea/vomiting at PACU were comparable. Unlike our expectation, SPI was not different between the patients receiving nicardipine and those receiving remifentanil under general anaesthesia. Thus, SPI does not seem to reflect the level of pain and may not help guide the use of opioids in the clinical settings with infusion of nicardipine during general anaesthesia.
**Conclusion(s):** The administration of nicardipine may confound the interpretation of SPI as a surrogate measure of the nociception-anti-nociception balance during general anaesthesia.

## 08AP12-11
### Influence of starting time of surgery on body fluid and hemodynamics in patients undergoing oral- maxillofacial surgery

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**Background and Goal of Study:** Oral intake of beverage is usually permitted until 2 hours before anesthesia. However, food intake is limited according to the starting time of anesthesia. In this study, we investigated the influence starting time of anesthesia on body fluid volume and hemodynamics of the patients undergoing oral-maxillofacial surgery under general anesthesia retrospectively.
**Materials and methods:** We checked the anesthesia records of patients, over 20 year-old, ASA-PS I or II, who underwent oral-maxillofacial surgery from February 2013 to November 2014. In some of these patients, cardiac function was monitored by the multi-frequency impedance method using Aescuron mini® (Heiwa Bussan Co., Ltd., Japan), and their body fluid volume was measured using a body composition analyzer (BioScan 920-II) (MP Japan Co., Ltd., Japan). The background of those patients (age, gender, height, weight, BMI), preoperative fasting time, anesthesia start time, duration of anesthesia, urine output and infusion volume were recorded. We extracted TBW (total body water), ECF (extercellular water), ICF (intercellular water), CI (cardiac index), CO (cardiac output), SV (stroke volume) and SVV (stroke volume variation) from the induction of anesthesia until 2 hours. These data were compared between cases started in the morning and cases started in the afternoon.
**Results and discussion:** Thirty patients were suitable for this study. 15 of these cases started in the morning (a.m. group), and other 15 cases started in the afternoon (p.m. group). There were no significant differences between the two groups in patients' background. In both groups, intake of clear water was permitted until 2 hours before the scheduled entry in the operating room. In the a.m. group, fasting time (216±64.9 min) was not significantly longer than that of the p.m. group (194.5±63.6 min). In the a.m. group, anesthesia started before 9:00 a.m., while in p.m. group anesthesia started around 1:00 p.m. In the a.m. group, TBW, ECW, ICW, HR was maintained higher compared to those of the p.m. group for 2 hours from the induction of anesthesia. However, CO, CI, SV and SVV were maintained stable in both groups. In the p.m. group, vasopressors were used in 4 patients at the anesthetic induction.
**Conclusion(s):** Late start of anesthesia might cause imbalance of body fluid. We should pay attention more carefully to hemodynamic condition especially in cases started late in the afternoon.

## 08AP12-12

### Association between preoperative transthoracic echocardiography and clinical outcomes after elective hip fracture surgery in elderly patients

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**Background and Goal of Study:** Preoperative transthoracic echocardiography (TTE) for the evaluation of cardiac function is not routinely recommended in patients undergoing non-cardiac surgery according to recently published guideline. However, whether preoperative echocardiography can predict postoperative mortality or cardiac complication in this group of patients is largely unknown.
We retrospectively evaluated if preoperative TTE variables are associated with 30-day mortality and cardiac complications after hip fracture surgery in elderly patients.
**Materials and methods:** A retrospective medical record review was conducted for patients over 65 years of age who underwent preoperative TTE within 1 month before scheduled elective hip fracture surgery between January 1, 2013 and December 31, 2014. Exclusion criteria were bilateral hip fracture surgery and reoperation due to infection or metal failure.
We recorded demographics, preoperative comorbidities, type of anesthesia, and echocardiographic data such as left ventricular ejection fraction (LVEF), mitral peak velocity of early filling (E), its deceleration time, the mitral peak velocity of late filling (A), the early diastolic mitral annular velocity of the septal mitral annulus (E'), and the ratios mitral early filling velocity to early diastolic mitral annular velocity (E/E').
Outcome variables were 30-day mortality after surgery and postoperative cardiac complications. Based on the significance of univariable logistic regression, the variables among the echocardiographic data were selected for multivariable logistic regression.
**Results and discussion:** A total of 203 patients were included in this study. The mean age was 80.2 years (SD=6.8) and 46 (22.6%) were male. Three patients (1.5%) died within 30 days after surgery. Postoperative cardiac complication developed in 15 patients (7.4%) including heart failure (9, 4.4%), atrial fibrillation (5, 2.5%) and myocardial infraction (1, 0.5%). By multivariable analysis these variables were found not to be associated with any of outcome variables.
**Conclusion(s):** We found that preoperative TTE variables were not associated with 30-day mortality or postoperative cardiac complications. Routine preoperative TTE is not recommended to predict postoperative cardiac complication or mortality in elderly patients scheduled elective hip fracture surgery.

## 08AP13-1

### Body weight and/or body mass index are related with renal graft function after living donor kidney transplantation?

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**Background and Goal of Study:** Kidney transplantation (KT) is the first choice cost-effective treatment for end-stage renal disease, with grafts from living donors providing the best chance of long-term transplantation success. Because transplantation in obese patients may be associated with higher risks and costs, the association of obesity and renal graft outcome has been studied, with the investigators retrieving conflicting results. The aim of our study was to evaluate the influence of weight and body mass index (IBM) on the outcome of renal function in living donor kidney transplanted (KT) patients.
**Materials and methods:** A retrospective observational audit was performed on living donor KT patients from January 2010 to December 2012. Data were collected from medical records. Recipient BMI was calculated by using height and weight at time of transplantation and categorized according to World Health Organization guidelines. The main outcome was glomerular filtration rate (GFR) at hospital discharge, and 1st, 3rd, 6th, 12$^{th}$ and 24th month postoperatively. Statistical analysis was done using IBM SPSS Statistics v.21. Spearman correlation was used to assess the relation between variables (significance level p <0,05).
**Results and discussion:** We analyzed 46 cases. Medium weight was 67.8 Kg (maximum 95, minimum 42) and medium BMI was 23.5 Kg/m$^2$ (maximum 35.7, minimum 17). 31% of the patients were overweight.There was no significant relation between weight and GFR at any point of follow-up. For BMI, a negative relation not statistically significant was noticed with GFR at hospital discharge (r=-0.219, p=0.15), 1$^{st}$ (r=-0.15, p=0.33), 3$^{rd}$ (r=-0.11, p=0.49), 6$^{th}$ (r=0.25, p=0.09), 12$^{th}$ (r=-0.22, p=0.14) and 24$^{th}$ (r=-0.12,p=0.43).Small studies in kidney transplant patients have demonstrated that high BMI at the time of transplant is associated with increased risk of wound and surgical site infections, delayed graft function, acute rejection, and graft loss. However, controlled prospective studies are lacking to validate this association.
**Conclusion(s):** In our study, neither weight or BMI were significantly associated with renal graft function, until at least two years postoperatively. It is urgent to clarify this issue, as many centers are reluctant to transplant overweight patients because of concerns over adverse outcomes.
**References:**
Transplant Proc. 2014 Nov;46(9):2981-3.Semin Dial. 2013 Sep-Oct;26(5):568-77.
Am J Nephrol. 2012;36(6):575-86.

## 08AP13-2

### Validity of activaed clotting time to predict blood loss in liver transplantation surgery

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**Background:** The activated clotting time (ACT) is a widely available point-of-care monitor to detect coagulopathy in the operating room, however, its value in patients with end-stage liver disease (ESLD) is poorly defined.
The aims of this study were to analyze factors affecting ACT value and to evaluate the validity of ACT to predict blood loss in end-stage liver disease (ESLD) patients.
**Materials and methods:** ACT and rotational thromboelastometry (ROTEM®) were performed simultaneously before anesthetic induction for LT in 294 ESLD patients (MELD score: median 13, IQR 9-19). ACT was measured using Hemochron 401 (International Technidyne, Edison, NJ). Correlation between ACT and the thromboelastometry INTEM clotting time (CT) was calculated. Receiver operating characteristic (ROC) analysis was used to evaluate the value of ACT to predict INTEM CT>240 s. Univariate and multivariate logistic regression analyses were performed to determine factors affecting ACT. Packed red blood cell (pRBC) requirements were compared between the recipients with normal ACT and those with prolonged ACT.
**Results and discussion:** ACT levels ranged from 74 to 222 s (median 143 s, IQR 130-158 s) and 47 recipients (16.0%) showed ACT>167 s (median 180 s, IQR 174-189 s). ACT showed a moderate correlation with INTEM CT (rho = 0.532, p <0.001). The optimal cut-off value of ACT for predicting INTEM CT>240 s was 150 s (AUC 0.78). In multivariate logistic regression analysis, predictors of ACT≥150 s were MELD score (odds ratio [OR]=1.10, p <0.001) and aPTT (OR=1.05, P=0.003). The recipients with ACT≥150 s received significantly more pRBCs than those with ACT<150 s during LT (median: 8.0 units vs. 4.0 units, p <0.001).
**Conclusion(s):** ACT was moderately correlated with INTEM CT. ACT might have value in diagnosing defect in intrinsic pathway and predicting blood loss in patients with ESLD when ROTEM® is unavailable.

## 08AP13-3

### Is perioperative saline administration during kidney transplantation associated with delayed graft function?

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**Background and Goal of Study:** The administration of intravenous saline (0.9% sodium chloride) is common during kidney transplant surgery. But, the high chloride content can induce hyperchloremic metabolic acidosis and could contribute to the development of acute kidney injury. The aim of the study was to determinate the impact of hyperchloremic acidosis on postoperative graft function.
**Material and methods:** Retrospective analysis of prospectively collected data from adult patients who undergone kidney transplantation in a French single center between January 2010 and December 2012. All patients received saline intraoperatively and postoperatively in intensive care unit. Hyperchloremic acidosis was defined by the association of a serum chloride level>105 mmol/L and a serum bicarbonate level<24 mmol/L during the first postoperative 48h. The primary outcome was delayed graft function (DFG) defined as the requirement for renal replacement therapy during the first week after transplantation. A multiple logistic regression model was performed.
**Results and discussion:** Two hundred and twenty one patients were included, 124 (56%) were male. The mean±SD volume of administered saline was 5025±157 mL. Ninety-one (41%) patients presented hyperchloremic acidosis and 39 (18%) presented DGF. After multivariate analysis, hyperchloremic acidosis was not found associated with DFG (OR=0.81 95%CI (0,36-1,83) p=0.61). Cold ischemic time, per 1-mn increase, (OR=1.001, 95%CI(1.00-1.002) p=0.05), recipient body mass index > 30 (OR=3.57 95%CI (1.40-9.10) p=0.007) and donor creatinine level, per 1-mmol-per-L increase, (OR=1.008 95%CI (1.00-1.017) p=0.06) were found associated with DFG.
**Conclusion:** Hyperchloremic acidosis is a frequent event after perioperative saline use during kidney transplantation but is not associated with DFG.

## 08AP13-4

### Causes and consequences of liver transplantation for fulminant hepatic failure at a single center

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**Background and Goal of Study:** Fulminant hepatic failure (FHF) is an acute, life-threatening deterioration of liver function characterized by hepatic encephalopathy, coagulopathy and jaundice in patients without previous liver disease. It accounted for 8% of indications for liver transplantation (LT) in Europe [(1)] according to the latest reports. The aim of this study is to evaluate outcomes after LT for FHF.
**Materials and methods:** Data from LT performed between January 2002 and December 2014 at our centre had been retrospectly analysed. We have studied the distribution of FHF as an indication for LT over the past few years, the differences in its outcome comparing to other indications of LT and the aetiology of this acute syndrome at our centre.
**Results and discussion:** A total of 469 patients who underwent LT were analysed. FHF was the indication in 18 of these patients (3,8%). The cause for FHF was unknown in 6 patients (33,3%). Viral hepatitis was found in 6 patients (33,3%): acute hepatitis B (16,6%), acute hepatitis E (11,1%) and acute hepatitis A (5,5%). Autoimmune hepatitis was diagnosed in 3 patients (16,6%), and drug related hepatic failure in another 3 (16,6%). We found some statistical differences between FHF patients and those who underwent a LT for another cause: age (45,1±12,4 vs. 53,8±8,6 vs.; p<0,01), female gender (72,2% vs. 27,8%). Some basal data were also significantly different: bilirubin (25,8±14,2 vs. 5,5±7,8; p<0,01), INR (3,2±1,4 vs. 1,6±1,1; p<0,01), prothrombine index (21,4±10,9 vs. 58,2±20,7; p<0,01), platelets amount (160.000 ±75436 vs. 88420±58342; p=0,01), MELD classification (31,33±6,8 vs. 16,8±7,3; p<0,01). During the surgery there were also some differences between the two groups: the number of red cell transfused (3,9 ± 2,5 vs. 6,3±8,2; p<0,01) and the platelets units infused (0,8±1,9 vs. 2,8±4,5; p<0,01). We found statistical association between FHF and reactivation of cytomegalovirus (OR 5,48 (95CI 2,07-14,48); p<0,01) and infections (OR 2,98 (95CI 1,13.7,86); p= 0,02): pneumonia, cholangitis, abdominal infection and catheter related infection. Survival proportion after one year was found to be similar in patients with FHF and in patients with other indications for LT (82% vs. 77%; p=0,2); this result is probably not significant because our sample size is too small.
**Conclusion(s):** Short-term survival after LT for FHF is similar to that of LT for other causes despite higher infectious complications rate.

## 08AP13-5

### Is blood transfusion really needed in living-donor liver transplant?

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**Background and Goal of Study:** Patients undergoing hepatectomy have a potential risk of extensive bleeding and blood transfusion requirement that it correlates with postoperative morbidity and mortality.
In case of living donor liver transplantation (LDLT) it is essential to reduce complications during the intervention at all levels. Therefore, reduction of transfusion requirements and especially restrict the use of allogeneic blood is a essential part of this strategy.
The objective of this study is to determine the efficacy, safety and effectiveness of autotransfusion in each technique.
**Materials and methods:** 26 patients between 2003 and 2015 undergoing surgery as donors in LDLT were analyzed retrospectively. In all cases a combination of saving techniques were used: preoperative blood donation, intraoperative recovery systems and acute isovolemic hemodilution (AIH).
We analyzed transfusion requirements and laboratory results; the associated complications of each technique were also reviewed.
**Results and discussion:** Of 26 cases reviewed, the average age was 34.11 years (+/-9.35) with a 50% female population. The duration of surgery was 10,79h (+/-2.8) with an average clamping time of 92.92 min +/- 31.32 ; the baseline hemoglobin was 13.2 (+/-1.4)
Of all the donors, 12 made preoperative blood donation with 2 blood units and 1 or 2 plasmapheresis. It has decreased gradually, therefore, next 8 pacients donated 1 blood unit and 1 or 2 plasmapheresis and the remaining 6 just made preoperative hemodonation with 1 blood unit.

| TRANSFUSION | PATIENTS |
|---|---|
| NO | 6(23%) |
| Autologous AIH | 20(76.92%) |
| Autologous preoperative | 7(26.92%) |
| Autologous CellSaver | 1(3.84%) |
| Heterologous | 1(3.84%) |

*[Transfusion requirements. N=26]*

We found no differences between the analytical parameters (Hemoglobin, platelets, PT, APTT and fibrinogen) according to their blood requirements.
We found a decreasing blood products requirements which may be due to an increased experience and improved surgical and anesthesic techniques.
**Conclusion:** Most patients require the administration of blood products intraoperatively, therefore it is important to implement a program of autotransfusion to eliminate the risks of allogeneic transfusion.
The combination of preoperative donation and acute isovolemic hemodilution are revealed as the most effective methods.

## 08AP13-6

### Risk factors for early postoperative pulmonary complications in liver transplant patients. A retrospective observational study

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**Background and Goal of Study:** Postoperative early pulmonary complication (PPC) in patients with liver transplantation affect survival rates and contribute to morbidity and mortality. Many factors are involved in the developpement of pulmonary complications; several preoperative and intraoperative variables

have been associated with the degree of PPC. In a report, a MELD score ≥ 25 points, an intraoperative fluid requirements >10 L and an intraoperative PRBC transfusion volume >4 L were all independent predictors of the risk of PPC [1]. This study aimed to identify other risk factors for early PPC.
**Materials and methods:** This retrospective observational study included 52 cirrhotic patients with liver transplantion. Exclusion criteria: patients with re-transplantation and intraoperative death, MELD score>25, intraoperative fluid requirements >10 l, intraoperative PRBC >4 l and patients with pulmonary disfunction before operation. During surgery, intraoperative bleeding, transfusion of blood derivates, concentrated coagulation factors and presence of postreperfusion syndrome (PRS) were noted. Chest X-ray was performed in the first 3 postoperative days (POD 1,2,3) and patients were extubated in the operating room or in the first 6 hours after surgery. Statistical analysis was performed in SPSS var. 19.0 using Mann-Whitney test and Fisher's exact test with p<0,05 statistically significant.
**Results:** This study included 30 men (58%) and 22 women. Mean age (±SD) was 50.3 (±13,51) years. Mean MELD (±SD) and MELD Na (±SD) scores were 14.9 (±5.23) and 17.38 (±6.01). The presence of postoperative pulmonary infiltrates in POD1-3 were not correlated with MELD score<25 (p=0.240), MELD Na score (p=0.100), nor with presence of PRS (48%), but a good correlation was found with intraoperative bleeding less then 4500 ml (p= 0.009) and transfusion of blood products: PRBC (p=0.008) and FFP (p=0.05).
**Conclusion:** Early PPC in liver transplant patients are not associated with the severity of the preoperative liver disease, nor with the intraoperative PRS. Intraoperative administration of blood products is a risk factor for PPC in this setting and efforts towards reduction of surgical bleeding and FFP administration are mandatory.
**Reference:**
1. P. Feltracco, C. Carollo, S. Barbieri, T. Pettenuzzo, C. Ori, World J Gastroenterol 2013 19(48): 9271-9281

## 08AP13-7

### Chronic kidney disease duration influence the renal graft outcome after living donor Kidney transplantation. Myth or fact?

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**Background and Goal of Study:** Chronic kidney disease (CKD) is a condition associated with high morbidity and mortality. Kidney transplantation is known to improve quality of life, and probably also longevity, with grafts from living donors providing the best prognosis.
There is some concern about the waiting time before transplantion, due to the accumulation of cardiovascular comorbidities associated with chronic renal failure and dialysis.The aim of our study was to evaluate the influence of CKD duration on the outcome of renal function in living donor kidney transplanted patients (LDKT).
**Materials and methods:** A retrospective observational audit was performed on LDKT from January 2010 to December 2012. Data were collected from electronic medical records.The main outcome was glomerular filtration rate (GFR) at hospital discharge, and 1st, 3rd, 6th, 12th and 24th month postoperatively. Statistical analysis was done using IBM SPSS Statistics v.21. Spearman correlation was used to assess the relation between CKD duration and GFR (significance level p <0,05).
**Results and discussion:** We analyzed 46 cases. Median time of CKD was 89 months (minimum 10, maximum 312). There were 4 cases of pre-emptive KT. Although a negative relation tendency was noticed, there was no significant relation between duration of CKD and renal graft funcion evaluated as glomerular filtration rate at hospital discharge (r=-0.23, p=0.14), or 1st (r=-0.15, p=0.32), 3rd (r=0.18, p=0.23), 6th (r=0.22, p=0.16), 12th (r=0.25, p=0.10) and 24th (r=-0.19, r=0.23) month postoperatively. It is well recognized that patients with CKD have increased risk for premature cardiovascular complications, with its incidence increasing over the years and also with dyalisis. All this negatively influences the long-term outcome of renal transplantation. Furthermore, pre-emptive transplantation seems to have beneficial effects on graft function from living donors.
**Conclusion(s):** In this study, duration of CKD was not associated with any impact on renal graft funcion from living donors, until at least two years post-operatively. Prospective and controlled studies are necessary to better clarify the impact of CKD duration on renal graft function received from living donors.
**Reference:**
Transplant Int 2014;27:19-27;Nephrol Dial Transplant (2015) 0: 1-7

## 08AP13-8

### Does donor or recipients' age influence the renal graft outcome after living donor kidney transplantation?

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**Background and Goal of Study:** Chronic Kidney Disease (CKD) is becoming more prevalent with the most efficient treatment being kidney transplantation (KT). Receiving a kidney from a living donor is associated with better long-term. Previous reports regarding deceased renal graft donors have called for caution in extending the age of kidney donors beyond 60 years due to the associated risks of lower glomerular filtration rate (GFR) and reduced allograft survival. However, there is no consensus on the upper age limit for these donors[1]. The aim of our study was to evaluate the influence of donor or recipients' age on RG function in living donor KT recepients.
**Materials and Methods:** We performed a retrospective observational audit of living donor kidney transplanted patients from January 2010 to December 2012. Data were collected from electronic medical records.The outcome studied was GFR at hospital discharge, 1, 3, 6, 12, and 24 months postoperatively.Descriptive and univariate statistical analysis were made (SPSS v.21). Spearman correlation was used to assess the relation between donor and recipients' age with GFR (p<0,05).
**Results and Discussion:** 46 cases were analyzed. Medium age of recepients was 39 years-old (maximum 70, minimum 15). Medium age of donors was 46 years-old (maximum 67, minimum 20).
We found a significant negative relation between receptors' age and GRF at hospital discharge (r=-0.57, p<0.001), 1st month (r=-0.56, p<0.001), 3rd (r=-0.44, p=0.003), 6th (r=-0.44, p= 0.003), 12th (r=-0.55, p<0.001) and 24th (r=0.43, p=0.005) month after KT.
Donors' age have a significantly negative relation with the outcome at 3rd (r=-0.52, p=0.001), 6th (r=-0.41, p=0.01), 12th (r=-0.48, p=0.002) and 24th (r=-0.49, p=0.002) month after KT. Donors' age didn't relate significantly with GFR at hospital discharge nor at 1st month postoperatively.
**Conclusion:** In our analysis, it seems that the age of living donor kidney transplant recipients has a negative influence on graft function, from as early as hospital discharge and at least until two years postoperatively. In what concers the donors' age, it also seems to have a similar negative effect on graft outcome, although the effect was not noticed until the 6th month after transplant. Prospective controlled studies are necessary to support the issuing of recommendations about the selection of living donors for renal transplantation.
**Reference:**
1. Saudi J Kidney Dis Transpl 2013;24(4):673-681

## 08AP13-9

### Impact of hemodilution on hemostasis and coagulation in liver transplantation

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**Background and Goal of Study:** We hypothesized that data from Rotem may be less influenced than the values of platelets and coagulation factors during Liver Transplantation (LT).
**Materials and methods:** To demonstrate our hypothesis we have analyzed prospective data from a randomized, multicenter, double-blind, placebo-controlled trial of pre-emptive administration of concentrated fibrinogen. The transfusion threshold for platelets and fibrinogen were 50.000 /mm and 1g/L, respectively; Data are expressed as mean (95% CI).
**Results and discussion:** 92 patients were included; 51 to the fibrinogen group and 48 to the saline group. In the fibrinogen group a median of 400 ml preemptive fibrinogen (3.54 g) were administered: 53% received RBC's, 17% platelets, 6% FFP, 21% tranexamic. 4.2% additional fibrinogen; median fluid therapy was 2459 ml. In the saline group a median of 300 ml of preemptive saline were administered; 43% received RBC's, 20.5% platelets, 17% FFP. 27% tranexamic. 22% fibrinogen through the procedure; median fluid therapy was 2350 ml.

| .* p<0.05 | Baseline | Differences After preemptive dose from baseline | Differences Reperfusion from baseline | Differences End-surgery from baseline |
|---|---|---|---|---|
| FIBRINOGEN GROUP N= 48 | | | | |
| Hemoglobin(g/L) | 11.52[10.93;12.10] | -1.43[-0.96;-1.89] * | -1.84[-1.37;-2.30] * | -1.65[-1.19-;2.12] * |
| Hematocrit (%) | 33.35[31.65;35.06] | -3.34[-1.94;-4.74] * | -4.27[-2.87;-5.67] * | -4.15[-2.74;-5.56] * |
| Platelet(103/mm3) | 86708[74227;99189] | -6979[1791.-15749] | 7520[16291;-1249] | 15085[23911;6260] |
| Fibrinogen(g/L) | 1.87[1.67;2.07] | 0.31[0.56;0.06] * | -0.16[0.09;-0.42] | - 0.21[0.04;-0.47] |
| ExT-MA10 (mm) | 37.13[34.74;39.52] | 3.92[6.28;1.56]* | 0.9 [3.31;-1.34] | 3.90[6.29;1.50] |
| FibT-MA10 (mm | 7.95[6.87;9.04] | 3.77[5.01;2.53]* | 2.44[3.66;1.23]* | 0.81[2.08;-0.47] |
| SALINE GROUP N= 44 | | | | |
| Hemoglobin(g/L) | 11.66[11.05;12.27] | -1.34[-0.85;-1.83] * | -2.4 [-1.94;-2.91] * | -2.50[-2.01;-2.98] * |
| Hematocrit (%) | 34.43[32.64;36.22] | -3.81[-2.32;-5.29] * | -6.8 [-5.42;-8.36] * | -7.21[-5.74;-8.68] * |
| Platelet(103/mm3) | 79045[66009.;92081] | -5636[3587;-14859] | 1363[10524;-7796] | 8318[17478;-842] |
| Fibrinogen(g/L) | 1.94[1.73;2.15] | -0.19[0.08;-0.45] | -0.28[-0.02;-0.55] | -0.38[-0.11;-0.64] |
| ExT-MA10 (mm) | 36.26[33.76;38.76] | 0.30[2.75;-2.15] | * -0.29[2.17;-2.75] | * 1.81[4.28;-0.66] |
| FibT-MA10 (mm | 9.18[8.07;10.30] | -0.16[1.13;-1.44] * | -1.42[-0.15;-2.73]* | -1.36[-0.08;-2.65] * |

*[Lab and Rotem Data]*

**Conclusions:** Pre-emptive dose of fibrinogen partially prevents from fibrinogen and clot-firmness at 10 minutes-Fib-Tem decrease. Platelets and clot firmness at 10 minutes-Extem were well maintained, even increased through the procedure.

## 08AP13-10

### Intraoperative hidroelectrolitic, acid-base balance and blood gases: the renal graft outcome influence after living donor kidney transplantation

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**Background and Goal of Study:** Kidney transplantation (KT) is the first choice treatment to improve chronic kidney disease health status.
Living donor KT has been rising in the past years, as it carries lower risks of complications or rejection, and better early function of the transplanted kidney. (1)
In our institution arterial blood gas samples are collected by protocol at pre-induction of anesthesia, post-induction and after renal artery unclamping.
The aim of our study was to evaluate the influence of intraoperative hidroelectrolitic, acid-base balance and blood gases on renal graft (RG) function after living donor KT.
**Materials and Methods:** Retrospective observational audit of living donor KT patients from January 2010 to December 2012.
Data were collected from medical records and included: age, sex, medical diseases, anaesthetic and surgical procedure duration, cold ischemia time, mortality rate and intraoperative gasometric values (pH, pCO2, pO2, HCO3-, Na+, K+, Cl-, aniongap, glucose, lactate, hemoglobin and hematocrit) at pre-induction, post-induction and after renal artery unclamping.
The outcome analyzed was glomerular filtration rate (GFR) at hospital discharge, 1, 3, 6, 12, and 24 month.
Descriptive and univariate statistical analysis were made using IBM SPSS Statistics v.21.
Spearman correlation was used to assess the relation between blood parameters and GFR (significance level p<0,05).
**Results and Discussion:** A total of 46 cases were analyzed. 24% were women. Medium age of Kidney recipients patients was 39 years-old (maximum 70, minimum 15). Median time of Chronic Kidney Disease was 89 months (minimum 10, maximum 312) and all patients were alive at two years post-transplant.
We found no statistically significant relation between any of the gasometric values at pre-induction, post-induction and post-unclamping of renal artery, and GFR at at hospital discharge, 1, 3, 6, 12, and 24 months.
**Conclusion:** Despite the constant concern regarding the intraoperative hidroelectrolitic, acid-base balance and blood gases on RG function after living donor KT, none of the analyzed variables appeared significantly related with the renal graft function evaluated as GFR until 2 year postoperatively. To our knowledge, this association has not been studied so far. There may not exist the need to collect Arterial Blood samples as often as it is done by protocol in our insitution during KT from living donors.
**Reference:**
1. Nephrol Dial Transplant (2015) 0: 1-7

## 08AP13-11

### Lab versus Rotem guided transfusion of blood products in liver transplantation

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**Background and Goal of Study:** The theoretical threshold for platelets and fibrinogen transfusion of clot firmness ExTem at 10 of 35 mm and FibTem at 10 minutes of 8 mm proposed in LT(1), has been analyzed
**Materials and methods:** Data from a randomized, multicenter, double-blind, placebo-controlled trial of pre-emptive administration of concentrated fibrinogen has been analyzed. The transfusion threshold for platelets and fibrinogen were 50.000 /mm and 1g/L, respectively. Data are expressed as mean (95% CI).
**Results and discussion:** 92 patients were included; 51 to the fibrinogen group and 48 to the saline group. In the fibrinogen group a median of 400 ml preemptive fibrinogen (3.54 g) were administered: 53% received RBC's, 17% platelets, 6% FFP, 21% tranexamic. 4.2% additional fibrinogen; median fluid therapy was 2459 ml. In the saline group a median of 300 ml of preemptive saline were administered; 43% received RBC's, 20.5% platelets, 17% FFP 27% tranexamic. 22% fibrinogen through the procedure; median fluid therapy was 2350 ml.

| | Baseline | Baseline Data Platelet<50.000/ mm3 Fibrinogen<1g/L ExTMA10<35 mm FibTMA10<8 mm | Reperfusion Data Platelet <50.000/mm3 Fibrinogen<1g/L ExTMA10<35 mm FibTMA10<8 mm | End surgery Data Platelet <50.000/mm3 Fibrinogen<1g/L ExTMA10<35 mm FlibTMA10<8 mm |
|---|---|---|---|---|
| FIBRINOGEN GROUP N= 48 | | | | |
| Platelet(103/mm3) | 8670 [74227;99189] | 1%[12.0%,37.3%] | 4%[ 2.3%,20.0%] | 2%[0.5%,14.5%] |
| Fibrinogen (g/L) | 1.8[1.67;2.07] | 5%[3.5% 22.7%] | 2%[0.5%,15.1%] | 0.0%[0.0%,6.4%] |
| ExT-MA10 (mm) | 37.13[34.74;39.52] | 17%[24.4%,54.5%] | 15%[19.1%,47.1%] | 7%[7.0%,31.4%] |
| FibT-MA10 (mm) | 7.95 [6.87;9.04] | 18%[27.%,57.9%] | 13%[15.3%,41.8%] | 16%[24.2%,55.5%] |
| SALINE GROUP N= 44 | | | | |
| Platelet(103/mm3) | 79045[66009.;92081] | 10%[11.5%,37.8%] | 8%[8.2%,32.7%] | 6%[5.2%,27.4%] |
| Fibrinogen (g/L) | 1.94 [1.73;2.15] 36.26 | 3%[1.4%,18.7%] | 7%[6.8%, 30.7%] | 7(%[6.6%,30.1%] |
| ExT MA10 (mm) | [33.76;38.76] 9.18 | 15%[22.7%,54.2%] | 18%[28.5%,60.3%] | 13%[18.1%,48.1%] |
| FlbT MA10 (mm) | [8.07;10.30] | 13%[18.1%,48.1%] | 22%[38.5%,70.7%] | 18%[28.5%,60.3%] |

*[Lab and Rotem data]*

**Conclusion(s):** Rotem criteria indicate that two times more patient would require platelets; and three times more patients would require fibrinogen replacement after liver graft reperfusion.
**Reference:**
1. Blasi A, et al.Transfusion. 2012; 52: 1989-98

# Acute Pain Management

## 09AP01-1

### Postoperative epidural analgesia. Our six months experience of acute postoperative pain unit

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**Background and Goal of Study:** Acute postoperative pain (APP) treatment is a management challenge. A proper coordination between health professionals, clinical services and managers is needed. For this reason, Acute Pain Units (APU) are created. We show our experience in Segovia General Hospital, during first year operation of the APU, in APP treatment through continuous epidural analgesia (CEA). We study the characteristics of the patients, technique data, the quality of analgesia achieved, side effects and complications.
**Materials and methods:** Transversal study of 117 patients with continuous epidural analgesia for APP control on scheduled surgery, during 6 months. Continuous epidural infusion of L-bupivacaine 0.125%+150microg of fentanyl and intravenous analgesia of Acetaminophen+Metamizole or Dexketoprofen were administered per protocol. We employed a data collection sheet.

**Catheter epidural analgesia**

Date of placement: ...../...../.....
ASA: I / II / III / IV
Surgical intervention:
.....
Allergies: .....
Patient ID

Medical history:
.....
Prior treatment with oral anticoagulants/antiplatelet drugs:
.....

Needle: ..... punction level: ..... Number of tries: .....
Epidural space- skin distance: ..... cm Catheter level from skin: ..... cm
Traumatic punction: NO / YES Accidental dural punction: NO / YES
Other incidents: NO / YES
Describe them:.....
Special tests of blood clotting: NO / YES
It is important to verify that not oral or intravenous opiaceous treatment is administered while catheter is working.

**Analgesic evaluation**: (at rest =re; in movement= mov).

| | | | |
|---|---|---|---|
| VAS REA1 | Painless | 0 1 2 3 4 5 6 7 8 9 10 | Worst p ev |
| VAS REA2 | Painless | 0 1 2 3 4 5 6 7 8 9 10 | Worts p ev |
| VAS PO1 | Painless | 0 1 2 3 4 5 6 7 8 9 10 | Worts p ev |
| VAS PO2 | Painless | 0 1 2 3 4 5 6 7 8 9 10 | Worts p ev |

**Motor block evaluation**:

| | | | |
|---|---|---|---|
| Bromage REA1 | No motor block | 0 1 2 3 | Cant´move |
| Bromage REA2 | No motor block | 0 1 2 3 | Can´t move |
| Bromage PO1 | No motor block | 0 1 2 3 | Can´t move |
| Bromage PO2 | No motor block | 0 1 2 3 | Can´t move |

| Perfusion rate: | Intraoperative | REA | PO1 | PO2 | Alerts from patient room: |
|---|---|---|---|---|---|
| (mL/h) or bolus | | | | | |

**Catheter withdrawal**:
Last time of LMWH: ..... hs.
Date of withdrawal: ..../.../..... Hour: ..... : .....
Incidents: .....
Accidental withdrawal out of security time: NO / YES... Neurological surveillance/ 4hs: NO / YES
Complications and notes:

*[Analgesia epidural protocol]*

**Results and discussion:** The study shows the following relevant data: 89.9 % are male, ASA II (64.9%), general surgery (73%); up 86.3% received concomitant analgesia and catheter removal time was 48 hours in 61.5%. In 25.6% of cases, side effects were present. In the first 24 hours, 45.5% reported mild pain (VAS 1-3), 24.2% moderate pain (VAS 4-7). 17.1% required rescue analgesia at some point. 26% reported side effects (8.8% paresthesias). Epidural analgesia provides pain relief, reduces opioids requirements and side effects while improves surgery outcomes. Epidural block should be performed before surgery time, with the goal of keeping the patient comfortable and pain-free. Continuous epidural analgesia requires a daily evaluation of mechanical and persistent pain.
Patients should be monitored closely. Spinal hematoma, epidural abscess or peripheral nerve injury may occur. After 48 hours, in the absence of complications, catheter is removed.

**Conclusions:** In our experience, CEA has been proven to be an effective treatment for APP. Although non-serious side effects appeared in 26 % of the patients, they were all controlled without further complications. It is necessary a qualified team with protocols well designed to develop an effective APU.

## 09AP01-2

### Evaluation of low dose of intrathecal morphine in the postoperative pain management of patients undergoing total knee arthroplasty

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**Background and Goal of Study:** Intrathecal opioid administration was a common practice in the previous years. However, this practice is actually discarded due to the adverse effects. Various studies show that intrathecal morphine used at low doses, has low incidence of adverse effects and provide good control of acute postoperative pain.
The aim of this study is to present our experience with low doses of spinal morphine in the postoperative management of total knee arthroplasty (TKA).
**Materials and methods:** We retrospectively reviewed the records of 27 patients (19 female /8 male), Undergoing TKA under spinal anesthesia with morphine and bupivacaine. The characteristics in terms of age and American Society of Anesthesiologists scale were similar in patients enrolled. All patients were carried to the Postoperative Acute care Unit and discharged between 6 and 10 hours.
In the postoperative period patients were followed by the Acute Pain Management Unit (APMU). Pain assessment by Visual Analogue Scale (VAS), anti-inflammatory medication, numbers of intravenous morphine rescues and side effects were evaluated at 24 and 48 hours.
**Results and discussion:** Mean age was 70 years (80/65). American Society Anaesthesiologists score was II in 15 patients and III in 12. Intrathecal morphine was used in combination with hyperbaric bupivacaine 0.5% (average 8.86 mg). In 20 patients morphine dose was 70 mcg, and in 7 was 100 mcg (average 82.87 mcg). In all of them the same pattern of postoperative analgesia was followed using the AMPU intravenous protocols for TKA (Dexketoprofen 50 mg each 8 hours combined with Paracetamol 1 g / 8h and and intravenous morphine rescue with a patient controlled analgesia (PCA) pump, programmed with a bolus of 1 mg each 10 min). The VAS scale average at 24 and 48 hours after surgery, at rest and in motion was 2.43 and 5.1 (24 h); 44.37 and 6.25 (48 h), respectively. Intravenous morphine with PCA requirements average at 24 and 48 was 8.7 mg and 6.71 mg, respectively. Two patients had nausea and vomiting, one patient had itching and no one respiratory depression.
**Conclusion:** Intrathecal morphine in a low dose range of 70-100 mcg provides safe and effective postoperative analgesia in the immediate postoperative period for patients with knee arthrosis undergoing total knee replacement. Higher doses do not increase the analgesic effect and can increase the incidence of adverse effects.

## 09AP01-3

### Meralgia paresthetica after abdominoplasty with neuraxial anesthesia: a case report

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**Background:** Meralgia paresthetica (MP) is a clinical syndrome characterized by sensory dysfunction of the lateral femoral cutaneous nerve (LFCN) and it may be due to compression or direct nerve injury. This study aimed to report a case of MP after plastic surgery, its pathophysiology and treatment based on the relevant literature reviewed.

**Case report:** Female, 60 years old, Asa II, submitted to abdominoplasty under epidural block, presented on the immediate postoperative, anesthesia in the anterolateral region of the right thigh. Ten days later, the numbness was replaced by continue burning pain, and dysesthesia. After the evaluation in the pain outpatient setting it was excluded any possibility of neurological injury by epidural block and the clinical diagnosis of MP was established. Pregabalin was initiated but it has been a resistance to the adhesion and the patient quit the treatment. Twenty weeks ahead, the patient still complaining of the burning pain feelings.
**Discussion:** Related to pain syndromes, MP can unsettle the doctor-patient relationship. Moreover, this comorbidity can maneuver and be associated with chronic pain[1]. In the surgical scene, the MP may occur in iatrogenic way due to the surgical manipulation in some places near the LFCN pathway[2,3]. In this report, we related a case of MP after abdominoplasty in a patient who underwent to a epidural block. This fact, was a confusion element to establish the real diagnosis. The final conclusion supported that the injury of NCFL might be due to the classic abdominoplasty incision once as it known that this nerve has a variety of pathways after leaving the lombar plexus. Furthermore the relevant medical aspects of this case, such as anesthetic technique being an important issue as differential diagnosis, it is important to emphasize that plastic surgery procedures mandatory needed of achieve outcomes with no complications. The understanding of this complication is a factor to increase quality and safety of surgical care.
**References:**
1. Patijn J, Mekhail N, Hayek S, et al. Meralgia Paresthetica. Pain Pract. 2011 May-Jun. 11(3):302-8
2. Mattera D, Matínez F, Soria V, et al. Surgical anatomy of the lateral femoral cutaneous nerve in the groin region. Eur J Anat 2008;12(1):33-7
3. Watson J, Huntoon MA. Neurologic evaluation and management of preoperative Nerve injury. Reg Anesth Pain Med 2015 Sep-Oct;40(5):491-501
**Learning points:** MP is possible complication of plastic surgery and it can leads to chronic pain.

## 09AP01-4

### Could a multimodal analgesia technique with tramadol, ketamine plus electroacupuncture overcome the gold standard epidural postoperative analgesia in radical prostatectomy? A prospective study

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**Background and Goal of Study:** The aim of this study was to compare a multimodal analgesia technique with intravenous (iv) administration of tramadol and ketamine in combination with electroacupuncture (EA) technique versus epidural administration of ropivacaine, in patients undergoing radical prostatectomy with respect to the efficacy of postoperative analgesia and the incidence of adverse effects.
**Materials and methods:** After written consent, 70 patients, ASA I-III, undergoing radical prostatectomy were randomly assigned in two groups. In group 1 (n=35) epidural analgesia technique was applied with ropivacaine 0.2%. In group 2 (n=35) a multimodal analgesia technique was administered with iv tramadol (0.15mg/kg/h) plus ketamine (0.15mg/kg/h) in combination with EA application. A certified acupuncturist placed the needles into the L.I.4 point at a 2-cm depth in both hands when the closure of the abdominal walls was initiated in the group 2. EA was applied for 30 min using an EA stimulator at a 100-Hz frequency and a constant pulse program. EA was administered again at the ST36 and L.I.4 points for 30 min at a 4-Hz frequency just after patient extubation. A bolus dose of the chosen regimen was given simultaneously with continuous infusion 30 min before the end of surgery in both groups. The infusion pumps were designed to provide 24h postoperative pain relief. Analgesic efficacy, additional analgesics and side-effects were evaluated at 6h and 24h postoperatively. Pain intensity was assessed using the Visual Analogue Scale (VAS 0-10).
**Results and discussion:** Demographic data were similar between groups. Patients in group 2 showed statistical significant lower VAS scores at rest at 6h ($p<0.01$) and 24h ($p<0.001$) postoperatively compared to group 1.
At 24h postoperatively, at movement, group 1 showed statistical significant higher pain scores compared to group 2 ($p<0.001$).
Group 2 showed significant faster bowel movement, at all time intervals, compared to group 1 ($p<0.001$). Additional analgesics were provided in patients of both techniques with no statistical significance between them. No statistical differences between groups were noted concerning adverse effects.
**Conclusion(s):** In patients undergoing radical prostatectomy, the use of EA technique with the combination of tramadol plus ketamine was more effective concerning postoperative pain relief and bowel movement compared to epidural use of ropivacaine.

## 09AP01-6

### Comparison between fascia iliaca compartment block and intramuscular piroxicam for on-arrival analgesia in femur fracture: a prospective randomised study

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**Background and Goal of Study:** Hip fracture patients have severe pain on arrival to the emergency. In low resource setups most of these patients receive conventional analgesics and are kept on wait till they are optimised for definitive surgical treatment. As most of the patients belong to the geriatric age group, untreated or under treated pain gives rise to delirium, sleep deprivation and increased morbidity and increases the overall morbidity. Conventional pain relief like opioids and NSAID causes side effects. The main objectives of this study were to compare analgesic efficacy, patient satisfaction, duration of action by fascia iliaca compartment block (FICB) and intramuscular (IM) piroxicam for on arrival analgesia in fracture femur.
**Materials and methods:** 60 patients with diagnosed or suspected femur fracture were included in the study immedietly after arrival to the emergency department before shifting the patient to radiology. Patients were randomised into two groups (n=30). Group FICB received FICB with 0.2% ropivacaine, while patients in Group PIROX received IM piroxicam 40 mg on the affected buttock. Pain was measured on visual analogue scale (VAS). Patients received rescue analgesics when required. Onset, duration, efficacy and patient satisfaction were recorded.
**Results and discussion:** Maximum pain relief was better in the FICB group both at rest ($P<0.01$) and on movement ($P = 0.02$). The median total morphine consumption was 0 mg (interquartile range, 0-2 mg) in the FICB group and 5 mg (interquartile range, 4-6 mg) in the morphine group ($P<0.01$). Efficacy and patient satisfaction was better in FICB group. Onset of action in FICB was faster (18.63 min) to piroxicam (33.53 min). Duration of analgesia was longer in piroxicam (14.66 hours) to FICB (12.06 hours).
**Conclusion(s):** FICB is an easy and effective method for pain relief with faster onset and lesser side effects whereas IM piroxicam has longer duration of action, can be administered even by untrained personnel with concerns of gastritis.

## 09AP01-7

### Ultrasound guided continuous fascia iliaca block for pain management in elder patients with hip fractures

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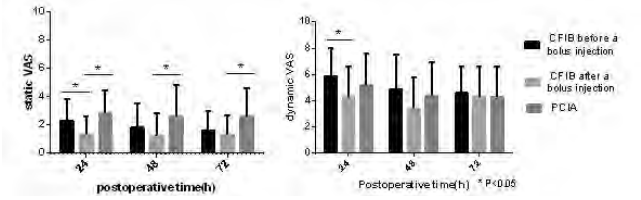
**Background and Goal of Study:** Providing satisfactory and safe analgesia is a major challenge for elder patients with hip fractures. The aim of this study was to compare the analgesia efficacy and safety between continuous fascia iliaca block analgesia (CFIB) and patient-controlled intravenous analgesia (PCIA) in elder patients undergoing hip fracture surgery.
**Materials and methods:** 32 patients (ASA II-III, ages 66-90 years old) scheduled for hip fracture surgeries were randomized into two groups. Patients of Group CFIB were placed a fascia iliaca catheter under ultrasound guidance and 30mL 0.33% ropivacaine was injected via the catheter before standardized general anesthesia. After surgery, a continuous infusion of 0.15% ropivacaine at rate of 2mL/h via the catheter, and a bolus of 30ml 0.15% ropivacaine was injected every 24h for 3 days after surgery. Patients of Group PCIA received standardized general anesthesia and intravenous patient-controlled analgesia using sufentanil for 3 days after surgery.
**Results and discussion:** There was no difference in pain intensity during movement (dynamic VAS) and rest (static VAS) before a bolus injection between the two groups 24h, 48h and 72 h after surgery. After a bolus injection, both the static and dynamic VAS decreased in Group CFIB, but only the VAS

in 24h postoperatively was found difference (static VAS: 2.3 ± 1.5 vs. 1.3 ± 1.3, P=0.039; dynamic VAS: 5.9 ± 2.1 vs. 4.5 ± 2.3, P=0.041), and compared to Group PCIA, only the static VAS was found difference (at 24h: 1.3 ± 1.3 vs. 2.8 ± 1.6, P=0.006; at 48h:1.2 ± 1.6 vs. 2.6 ± 2.2, P=0.044; at 72h:1.3 ± 1.4 vs. 2.6 ± 2.0, P=0.049). There was no difference in analgesic rescue between the two groups. Fewer side effect and better cooperation were found in Group CFIB. In Group PCIA, three patients removed the PCA devices because of nausea and vomiting. And a delirium and a respiratory depression in post anesthesia care unit respectively were found.




*[Postoperative VAS]*

**Conclusion(s):** These preliminary results showed similar analgesia efficacy between continuous fascia iliaca block and patient-controlled intravenous analgesia. Fewer side effect and better cooperation were found in continuous fascia iliaca block.

## 09AP01-8

### Analgesia for total knee arthroplasty using continuous femoral nerve block: comparison between two rates of drug infusion using 0.125% levobupivacaine

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**Background:** Total knee arthroplasty (TKA) is associated to severe postoperative pain. For its control, continuous femoral nerve block (CFNB) analgesia has proven as a successful technique, but the proper infusion rate is controversial.
Our goal is to evaluate the efficiency and safety of two infusion rates of 0.125% levobupivacaine through a CFNB after TKA.
**Material and methods:** Comparative and retrospective study of 382 patients scheduled to TKA with postoperative analgesia using CFNB between 2014 and 2015.
Patients are divided in two groups, depending on the infusion rate with 0.125% levobupivacaine: 7 ml/h or 12 ml/h (5ml boluses, 30 min. closure time). For both groups, complementary analgesia was conducted with paracetamol and dexketoprofen and first rescue analgesics was tramadol.
Demographic characteristics, VAS (mm) scores at rest and in motion after 24h, dispensed boluses and complications were recorded.
**Results:** 382 patients were included, 245 in the 7 ml/h infusion rate group and 137 in the 12 ml/h one. No demographic differences were found among both groups. The group of 12 ml/h registered slightly lower VAS medium levels than the 7 ml/h group after 24h, being statistically not significant ($p > 0.05$) (Table 1). Patients that received an infusion rate of 7 ml/h needed a higher amount of boluses than those of the 12 ml/h group (5 or more boluses: 45.1% in 7 ml/h group vs. 39% in the 12 ml/h group). All the complications recorded are shown in Table 2.
The best choice of local anesthesic, including concentration and optimal volume, is controversial. Infusion rates under 4-6 ml/h for CFNB have been proven to be inefficient, but the use of higher rates has not yet been sufficiently studied.

| *VAS 24h* | At rest (mm) | In motion (mm) |
|---|---|---|
| **Group 7ml/h** | 26,2 ( SD 21,8) | 32,2 (SD 29,9) |
| **Group 12ml/h** | 24,8 (SD 19,6 ) | 32,1 (SD 22,2) |

*[Table 1]*

| *COMPLICATIONS* | Group 7ml/h | Group 12ml/h |
|---|---|---|
| Nausea/vomits ($p<0.05$) | 14,6% | 5,1% |
| Motor block | 0,8% | 0,7% |
| Paresthesia | 4% | 4,3% |
| Catheter released | 9,7% | 8% |

*[Table 2]*

**Conclusions:** Using of high infusion rates (12 ml/h) of 0.125% levobup. through a CFNB delivers a similar analgesia in comparison to moderated rates (7 ml/h) without increasing complications.
However, a high infusion rate seems to decrease the necessity of rescue analgesia and thus the resulting complications due to opioids consumption.

## 09AP01-9

### Safety of diamorphine based epidural mixture in postoperative analgesia: experience from a tertiary hospital in United Kingdom

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**Background and Goal of Study:** Diamorphine, a long acting opioid had been regularly used in the past to provide post-operative epidural analgesia in UK[1]. Its use has rapidly declined in the last 2 decades[2]. Diamorphine based local anaesthetic mixture is infused at lower rates in comparison to Fentanyl based solutions; hence, produces less sympathetic and motor blockade.
The goal of this retrospective study was to evaluate the "Safety" of Diamorphine based epidural analgesia in post-surgical patients.
**Materials and methods:** We obtained approval from local audit and research department. All the patients who had postoperative epidural analgesia between Feb.2014 and Oct.2015 were included in the study.Data was obtained from acute pain audit data, patient's electronic and paper notes.Data collected include demographics, surgical details, epidural procedure details, pain scores and the side effects.
**Results and discussion:** We collected data on 310 (n) patients, with median age of 67 ± 13 years (SD).85% of epidurals were performed for elective surgeries.35% (110) of the patients developed hypotension. 61%(191) patients needed additional fluids and or ionotropic support.19% (59) patients were sedated(sores 1-3) needing alterations in epidural rate and concentration of Diamorphine. Lower limb motor block was documented by modified Bromage score (1-3) in 6% (18) patients of which 72.2% patients had Lumbar epidural. 6.1% (19) patients developed respiratory complications, of which 68.4% had supra-umbilical incision. 14.8% (46) patients developed itching and 3.8% (12) patients suffered from post-operative nausea and vomiting.None of the non-catheterised patients (29) had urinary retention.
There was no correlation between epidural infusion rate and the development of postoperative hypotension or increased use of intravenous fluids and vasopressors although other causes of hypotension could not be excluded.
**Conclusion(s):** Our study shows that Diamorphine could be safely used as an alternative opioid in epidural mixture for providing post-operative analgesia.
**References:**
1. H. C. Romer and G. N. Russell, "A survey of the practice of thoracic epidural analgesia in the United Kingdom," *Anaesthesia*, vol. 53, no. 10, pp. 1016-1022, Oct. 1998
2. S. H. Pennefather, S. Gilby, A. Danecki, and G. N. Russell, "The changing practice of thoracic epidural analgesia in the United Kingdom: 1997-2004," *Anaesthesia*, vol. 61, no. 4, pp. 363-369, Apr. 2006

## 09AP01-10

### Improvement in pain control with wound catheter after liver transplantation surgery

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**Background and Goal of Study:** Local anaesthetics have become increasingly popular for management of surgical pain after open hepatic surgery. In addition to providing good analgesia, local anaesthetic wound infiltration is safe and low cost. The benefit of this technique remains controversial related to the position of the catheter. Therefore, the analgesic efficacy of continuous local anaesthetic instillation after liver transplantation surgery remains unknown.
The aim of this study was to assess the analgesic efficacy of continuous wound instillation of ropivacaine in patients undergoing liver transplantation surgery with the catheter placed within the musculo-fascial layer of the abdominal wall.
**Materials and methods:** All liver transplant patients from January 2015 to November 2015 were collected. Since June 2015 a new analgesic protocol is developed to post-liver transplant based on continuos local anaesthetic infiltration by wound catheters with rescue pain by bolus of morphine. So we can compare the new protocol (protocol B) versus the management standard based in intravenous morphine (protocol A).
**Results and discussion:** In the study period they were recorded 83 liver transplants. 58 patients were included in the protocol A (estandarized of intravenous morphine) 86,2% male, average age was 56.2 years (SD 12.5) and avarage weight 72.7 Kg (SD 14.4). 25 patients were included en protocol B (catheher instillation), 80% male, average age was 56.3 years (SD 7.5) and avarage weight 80.9 Kg (SD 13.1). The visual analogue scale (VAS) obtained in patients included in protocol A was 3.8 (SD 2.6) with stayed in the critical care unit of 3.7 days (SD 5,3) while the VAS obtained in patients included in protocol B was 2.8 (SD 2.6) and the stayed in the critical care unit of 3.3 days (SD 2.4). There was a difference in the rescue dose of morphine used during the first 72 hours postoperative of 28.4 mg (SD 11.7) with protocol A versus 19,1 mg (SD 4,6) using protocol B.
**Conclusion:** A better pain control, decreased stayed in critical care unit and reduced morphine consumption were detected in patients included in new protocol based on continuos local anaesthetic infiltration by wound catheters with rescue pain by bolus of morphine in liver transplant patients. These improvements in pain control patient could save costs.

## 09AP01-11

### Postoperative analgesic efficacy of the transversus abdominis plane block with USG guided in the elective cesarean section

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**Background and Goal of Study:** In this study we aimed to evaluate postoperative analgesic efficacy of transabdominal rectus plexus block (TAP) with USG guided in cesarean section during 24 hours after operation.
**Materials and methods:** Following Ethics Commitee approval and informed patient consent; patients undergoing cesarean section were chosen with randomized double blinded by sealed envoloped technique. Patient has been monitarized with noninvazive techniques as electrocardiogram, $SPO_2$ and noninvazive blood pressure measuring. Anesthesia induction were obtained with 2-2.5 mg/kg propofol and 0,6 mg/kg rocuronium. After intubation following delivering of the baby anesthesia maintenance were obtained with sevoflurane and remifentanil infusion (0.05-0.2 $\mu$g/kg/min) Patients were divided into two randomized groups before anesthesia induction. At the end of the operation TAP Block was performed with USG guidence before patient awakening.
In Group T (n=15); TAP block with USG guidence were given 0,25 % bubivacaine 60 ml (30 ml at each side).
In Group S (n=15) were given 0,9 % NaCl 60 ml ( 30 ml at each side ).
The anesthesiologist who was collecting the data has no idea of in which group was the patient. During the operation heart rate, sistolic, diastolic arterial pressure was recorded 15 minutes interval time. 1 mg/kg meperidin IV was given at the end of the surgery.
Pain score has been assessed with Visual Analog Scale (VAS) and Verbal Desciriptor Scales in the postoperative 0, 5, 15, 30 minutes and 1, 2 , 4, 12 ve 24 hours. Patient Controlled Analgesia (PCA) pump was prepared with meperidine (10 mg bolus and 15 minutes of lock out time) and was used all the patients. If VAS score still remains bigger than three 1 gr paracetemol IV, tenoxicam 20 mg IV and 0.5 mg/kg meperidine IV has been given sequentially.
**Results and discussion:** Group T's first time on the need for analgesia, was significantly higher than in Group S (p:0.003). Total dose of meperidine in need of analgesia was significantly higher in Group S than Group T .(p:0.001) Tenoksikam and paracetamol used in Group S is significantly higher than Group T. (GrT; 0±0, GrS;14,67±9,15, Gr T; 0±0, GrS: 0,4±0,51, p:0.001; p:0.007).
**Conclusion(s):** As a result TAP block is a good alternative in multimodal analgesia management which is a simple, practical and effective that reduces the need of post operative analgesia and it is comfortable for the patients.

## 09AP02-1

### An audit of analgesic effect of patient-controlled analgesia using hospital information system - a classification tree approach

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**Background and Goal of Study:** Although assessing analgesic effects of patient-controlled analgesia (PCA) is essential for acute pain service, such routine assessment is a heavy burden for an understaffed team. This study demonstrated how to evaluate analgesic effects of PCA by direct data retrieval from a hospital information system (HIS). A classification tree methodology was also applied to the identification of factors associated with moderate to severe pain during the PCA course.
**Materials and methods:** Patients receiving postoperative PCA in 2012 were included in this retrospective study. The numeric rating scale (NRS) pain measurements were directly retrieved from the HIS and then mean pain scores were calculated on a daily basis for 7 postoperative days. Tree-based classification methods were applied to identify conditions associated with NRS > 4. Patient characteristics and PCA pump settings were regarded as potential predictors of higher NRS in the classification tree analysis. Subgroup analyses were further conducted in patients receiving intravenous PCA (IVPCA), lumbar patient-controlled epidural analgesia (PCEA) or thoracic PCEA.
**Results and discussion:** There were 4012 patients and among them, 2886, 458 and 668 patients received postoperative IVPCA, lumbar PCEA and thoracic PCEA, respectively, with totally 27,396 mean daily NRS pain measurements included in the analysis. The daily mean NRS during the 7 postoperative days for different surgical types by distinct types of PCA ranged from 0.9 to 3.2. Classification tree analysis revealed that gynecologic patients receiving IVPCA had higher incidence of NRS > 4 in the first postoperative days (15.2%), as well as those who received abdominal surgery and postoperative IVPCA with age <50 years (14.3%). For patients receiving thoracic PCEA, it was noted that patient had higher incidence of moderate to severe pain after the discontinuation of PCA (the fourth and fifth postoperative day, 10.1%). No patient subgroup had more than 10% incidence of moderate to severe pain in those receiving lumbar PCEA. PCA pump settings were not associated with the incidence of higher pain scores.
**Conclusion(s):** Direct data retrieval from the HIS provided a convenient way to evaluate analgesic effects of PCA over time. The tree-based classification analysis offered useful information to improve the quality of postoperative acute pain management.

## 09AP02-2

### Audit of pain management following emergency laparotomies in cancer patients: a prospective observational study from an Indian tertiary care hospital

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**Background:** Pain management following emergency laparotomies is a challenge in view of poor general condition of patients, odd timings and poor outcomes of surgery. Current recommendations favor multimodal opioid sparing techniques including epidural analgesia following elective laparotomies, no such recommendation exists for emergency surgeries. There exit a variability in use of regional analgesia in this group. Possible reasons accounting this variability could be preoperative surgical or anaesthesia concerns, lack of time or skills.
**Aim:** To study current pain management practices in emergency laparotomies and to understand factors influencing the choice of pain management technique.
**Methods:** Following approval from hospital IEC, the audit was registered with Clinical Trial Registry of India (2014/07/004782). This is an observational study of perioperative pain management of adult patients following emergency laparotomy from Aug 14- Feb 15. Data analyzed included indication, time of surgery, ASA grading and P-POSSUM score of patients, analgesia used, pain scores, patient satisfaction score and experience of the on call anesthesiologist.
**Results:** Data from 135 patients were analyzed. Intestinal obstruction was the commonest indication for emergency laparotomy with diversion colostomy and hemicolectomy forming the major bulk of surgeries performed during emergency hours at our institute-a tertiary cancer centre. Majority of patients (95%) belonged to ASA I/II E grade, with a predicted mortality of 0-5% (using P-POSSUM score) in 66% of patients. Perioperatively, opioids were the mainstay of pain management. Epidural analgesia was used in 9% of patients even though 75% of cases were conducted by anaesthesiologists confident/expert in thoracic epidural insertion. Referral to Acute Pain Service (APS) team was made in 31% of the cases. Pain at movement was moderate-severe in more than 60% of patients within first 24 hrs and in 37% patients at the end of 72 hrs. Overall satisfaction with the pain management was significantly higher among patients managed by the APS team (mean score = 7) than those managed by the unit (mean score = 5).
**Conclusion:** Epidural analgesia for pain management in emergency laparotomies are less preferred, opioids are the mainstay. Lack of experience, patient factors are not the primary reason for these techniques not gaining popularity. Prospective studies defining the role of regional /opioid sparing techniques in this group is needed.

## 09AP02-3

### Remifentanil for LRYGB: Is opioid-induced hyperalgesia important following bariatric surgery?

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**Background and Goal of Study:** The management of post-operative pain following Laparoscopic Roux-en-Y gastric bypass (LRYGB) is challenging: sedation, immobilisation and hypoventilation can result from the administration of opioid analgesics. Remifentanil can facilitate optimum intubating conditions, haemodynamic stability and reduced use of long-acting opioids. However, acute opioid-induced hyperalgesia (OIH) may increase post-operative pain. Specific data on OIH in bariatric surgery is lacking. We investigated whether intra-operative remifentanil was associated with differences in post-operative analgesic consumption or patient outcomes.
**Materials and methods:** A retrospective review of LRYGB surgery was performed. Data were collected from an existing surgical database, electronic prescribing system, and review of anaesthetic charts. Patients anaesthetised by a single Consultant were analysed before and after a change in practice (from using Remifentanil to not using Remifentanil).
**Results and discussion:** Thirty-eight cases were analysed. In 20 cases, intra-operative remifentanil was used. In 18 cases, remifentanil was not used. All other aspects of anaesthetic technique were consistent, in particular intra-operative analgesia. Patients in the remifentanil group received more intra-operative and recovery morphine (p=0.0376). This group also spent significantly longer in recovery (p=0.0058). No significant differences in mean overnight morphine consumption, time to mobilisation or length of stay were seen.
**Conclusion(s):** We have examined small, but well matched, groups of patients having LRYGB with and without intra-operative remifentanil, and found significantly reduced opiate consumption and recovery time. High doses of remifentanil could be associated with increases in acute pain after surgery, although systematic review has found conflicting evidence regarding the existence of OIH[1]. Our results may reflect reduced sedation or improved analgesia in the absence of OIH. We acknowledge that conclusions are limited by the small numbers involved, with potential for confounding variables. It is nonetheless an important observation which ought to prompt larger scale studies into OIH in the Bariatric population.
**Reference:**
1. Rivosecchi, Ryan M., et al. "An evidence based systematic review of remifentanil associated opioid-induced hyperalgesia." *Expert opinion on drug safety* 13.5 (2014): 587-603.

## 09AP02-5

### The effect of non-opioid analgesics on opioid use in general anesthesia

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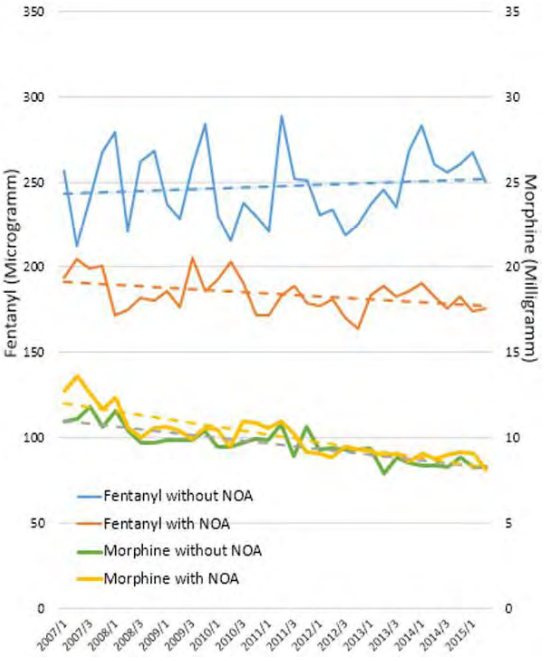
**Background and Goal of Study:** Use of non-opioid analgesics (NOA) has been shown to reduce the requirement for perioperative opioids, and thus potentially decrease opioid side effects. This study examined longitudinal trends in NOA use and associated changes in opioid administration.
**Materials and methods:** Data on opioid and NOA (dipyrone and ketorolac) use in adults during general anesthesia (without additional regional anesthesia) were retrieved from the computerized anesthesia information system for April 2007 to September 2015. Temporal changes in NOA and opioid use and dosages were examined.
**Results and discussion:** Data from 61,646 surgeries were analysed. NOA administration increased linearly from 333/1431 (23.3%) patients (second quarter 2007) to 1381/1920 (68.6%) patients (third quarter 2015, p<0.001). Mean morphine dose/patient was similar with or without NOA (with NOA: 12024 patients, 10.1±1.3mg; without NOA: 8961 patients, 9.6±1.0mg, p=0.66). Mean morphine dose per patient declined over time at a similar rate for patients who did or did not receive NOA (Figure 1).




*[Figure 1. Mean Doses of Opiods with or without Non-Opioid Analgesics for General Anesthesia over 8.5 Years]*

Mean fentanyl dose per patient was lower in patients receiving NOA than in patients not receiving NOA (with NOA: 29,530 patients, 184±11μg; without NOA: 25,422 patients, 247±21μg, P<0.001). The mean fentanyl dose per patient decreased over time for patients receiving NOA, while it increased for those not receiving NOA (Figure 1).
**Conclusion(s):** NOA administration in general anesthesia increased significantly over 8.5 years. NOA use was not associated with a change in morphine dosing. Fentanyl dose decreased over time in patients receiving NOA, but increased in patients not receiving NOA. This might reflect case selection - e.g. patients not planned for extubation may have received higher fentanyl doses and not be candidates for NOA. These findings suggest that factors other than NOA administration influenced opioid dosing.

## 09AP02-6

### Comparison of low-pressure vs. standard-pressure pneumoperitoneum laparoscopic cholecystectomy on postoperative pain and quality of recovery

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**Background and Goal of Study:** Interventions for improving patient outcome in laparoscopic surgery includes working with low-pressure instead of standard-pressure pneumoperitoneum. However, this intervention remains controversial.
The aim of this study was to compare the effect of low-pressure (8 mmHg) vs. standard-pressure (12 mmHg) pneumoperitoneum on postoperative pain, analgesic requirements and quality of recovery when performing laparoscopic cholecystectomy(LC).
**Materials and methods:** Prospective, randomized, double blinded clinical trial. Ninety patients scheduled for elective LC were randomly allocated on low-pressure vs. standard-pressure pneumoperitoneum LC. Dexamethasone, fentanyl, remifentanil, paracetamol, dexketoprofen and wound infiltration with levobupivacaine were used intraoperatively. Postoperative analgesia included paracetamol and dexketoprofen, and morphine rescue was used if a visual analogic score (VAS pain 0-10) was >5. Postoperative VAS for abdominal pain, incidence and VAS for shoulder pain, morphine requirements and postoperative quality of recovery (QoR-15) were registered at 1, 6 and 24 postoperative hours(h). Percentage of patients who could not be discharged <24h was examined.
**Results and discussion:** Low-pressure LC patients showed significantly lower VAS pain scores for abdominal pain than standard-pressure LC at 1h (median 1 vs. 2.3, p=0.008 M-W) and 24h (0.8 vs. 1.7 p=0.010 M-W), but no at 6h (1.9 vs. 3.2 p=0.204 M-W ). Incidence and VAS score for shoulder pain were higher for standard-pressure LC, but not in a significant manner (8.6% (VAS median 3.2) vs. 0%(VAS 0) at 1h, 22.9% (VAS 3.5) vs. 14.5% (VAS 3) at 6h, 37.1% (VAS 3.9) vs. 21.8% (VAS 2.6) at 24h). More patients needed postoperative morphine rescue at standard-pressure LC (25.7% vs. 5.5%, P=0.006 Chi2). Quality of recovery was better in the low-pressure LC group (QoR-15 1h: 93.3% vs. 90% p=0.031 M-W, 6h: 91% vs. 87.3% p=0.019 M-W, 24h=96% vs. 92.6% p=0.016 M-W). 7.2% of patients in the low-pressure LC group and 14.2% in the standard-pressure LC group could not be discharged home <24h (p=0.471 Chi2). Main reasons for no discharge at 24h were surgical reasons instead of patient conditions.
**Conclusion(s):** Low-pressure LC was associated with lower VAS scores for abdominal pain, lower morphine requirements and better quality of recovery than standard-pressure LC. However, the magnitud of the effect could be low and it did not influence discharge.

## 09AP02-7

### Impact of remifentanil application modality on postoperative pain after brest conserving surgery

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**Background and Goal of Study:** Continual remifentanil use in anesthesia is related with postoperative hyperalgesia and opioid tolerance. Study investigate whether lowering remifentanil dose at the end of surgery impact on pain decrease, need for rescue analgesics and nausea appearance in postoperative period.
**Materials and methods:** Twenty five female patients, ASA 2 class, underwent brest conserving surgery in general anaesthesia, between January and October 2015. Anesthesia was induced with propofol and remifentanil. Anesthesia was maintained with propofol and with remifentanil in dose: group A (13/25) fixed dose: 0.4mcg/kg/min to the end of surgery, and in group B (12/25) from last 30 minutes of surgery, on every 10 minutes, remifentanil was gradually lowered from 0.4 to finally 0.1 mcg/kg/min. Tradamol 100 mg intravenously was given in both groups 15 min before end of surgery. Ketorolac was rescue analgesic. Pain score after arm movement and in rest (VAS and modified VAS), postoperative nausea and vomiting was followed in first 24h. Fisher's exact test and Wilcoxon rank sum test with continuity correction are used to test differences between groups.
**Results and discussion:** Average patients age 48.67, average BMI 24,20. A group (52%), average age 49.1, average BMI 24.07, B group (48%), average age 47.4 and BMI 24.50. Average surgery time was 81.9 min. There was statistically significant decrease in average pain score after arm movement and in rest in first 24 h between gruop B and A (2.07 vs. 4.0, p <0.05) and (1.04 vs. 3.0, p <0.05). Rescue analgesic use in first postoperative hour, in B vs A group was 1 vs 3 patients, p<0,01. One hour after dose of rescue analgesics pain score was B vs. A group 0 vs. 0.6, p <0.05. Nausea in 24h in B vs. A was 1.20 vs 3.40, p <0.01.
**Conclusion(s):** Gradual lowering of remifentanil 30 minutes before end of surgery significantly decreased pain score, nausea and use of rescue analgesics.
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## 09AP02-8

### First clinical experience of successful perioperative phantom limb pain prevention

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**Background and Goal of Study:** Phantom limb pain (PLP) prevention remains an important and unsolved problem. We present 5-component special drug prevention (SDP) scheme as novel multimodal approach to prevent PLP that is able to suppress specific pathogenetic PLP mechanisms on different levels of nervous system: anticonvulsant (Gabapentin), corticosteroid (Dexamethasone), protease inhibitor (Aprotinin), NMDA-receptor antagonist (Ketamine) and tricyclic antidepressant (Amitriptyline).
**Materials and methods:** We observed 28 oncological patients aged 48±19 after high amputation of lower/upper limb under general anesthesia (Group 1, n=14) or under general plus epidural anesthesia (Group 2, n=14). As all pre-

vious published approaches for pain prevention were not effective we have no control group from ethical point of view. Standard intra- and postoperative monitoring, VRS 0-4 at rest and during movement, questionnaire "Pain Detect" were performed. Five components were used in addition to traditional means of anesthesia and analgesia in different combinations 2-4 days before, during and for 6 months after amputation.
**Results and discussion:** 7-10 days after amputation patients experienced only mild sensory symptoms ceased on SDP scheme and mild stump pain (VRS): 1.38±0.3 (Group 1), 1.4±0.3 (Group 2). During 6-months follow-up none of patients of both groups have any of PLP symptoms; no any complications were registered. By the time of abstract preparation the presented multimodal approach allowed to completely prevent PLP in 53 patients and became a part of routine practice in our institution.
**Conclusion(s):** The novel 5 component multimodal scheme demonstrates high long-term efficacy in PLP.Implementation of this technology will markedly improve life quality and social activities including the perspective for further prostheses using. The SDP scheme is currently routinely applied in practice of Moscow P.A. Gertsen Research Institute of Oncology. Patent for invention of the Russian Federation was received 10.04.2012 (№ 2446795).

## 09AP02-9

### Observational acute pain study in admitted patients of a tertiary hospital in Spain

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**Background:** There are numerous sources that highlight the undertreatment of pain in hospitalized patients.This is not only a need but a right for patients. Many scientific societies guarantee it, including the Joint Commission on Accreditation of Healthcare Organization (JCAHO) with support from WHO. Pain is considered the fifth clinical constant [1]. The current status of pain in our hospital, is vital to plan and develop strategies in order to follow a Pain free Hospital.
**Methods:** An observational cross-sectional study was performed for 7 consecutive days to all patients admitted to a tertiary hospital of 300 beds. acute pain was collected by visual analog scale (VAS) at rest and in motion, VAS measurements were performed every 8 hours to all patients admitted, which generated more than 1350 VAS measurements of pain. Other variables of interest as the specific analgesic treatment (locoregional techniques),rescue analgesic medication administered, as well as sex, age, reason for admission, and specialty care was collected. Data was processed by SPSS v22 (IBM).
**Results:** 246 patients (149 surgical and 97 medical) were evaluated, the prevalence of episodes of moderate to severe pain (VAS> 4) was 53% (132/246) of all patients admitted.69% of surgical patients and 30% of medical patients underwent moderate-severe pain episodes.The average number of episodes (VAS> 4) occurred 1.45 ±2.0 times.The results showed an average pain VAS of 1.69 ± 1.96 IC95{0,5.6} at rest and 2.42 ± 2.49 IC95{0,7.4} in motion.
Rescue medication was administered to 38% of the observed patients (20% medical and 25% of surgical patients). Being acetaminophen the most used drug.
7.3% of all hospitalized patients received specific analgesic techniques 18/246. Corresponding to 1.6% (7) of medical patients and 5.7% (11) of surgical patients.
**Discussion:** The data are consistent with similar studies in other centers [2], however, these data are far from the goal of "Pain Free Hospital".
**Conclusion:** Pain assessment should be considered as the fifth leading vital sign.and it should be routinely evaluated.
The percentage of patients with moderate-severe pain is unacceptable and more measures are needed to meet the goal of Pain Free Hospital.
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## 09AP02-10

### The impact of patient controlled analgesia on prognosis of patients receiving major abdominal surgery

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**Background and Goal of Study:** Post-operative pain is a major disease burden after surgery. Patient controlled analgesia has been wide used for pain management in surgical patients, yet, large-scaled studies are lacking to assess its impact on the prognosis of patients.
**Materials and methods:** We prospectively enrolled patients who underwent major abdominal surgeries receiving patient controlled analgesia (PCA) and who received non-PCA analgesia for assessment of 60-day mortality, major post-operative complications using electronic medical chart system. Pain intensity was also assessed with visual analogue scale from post-operative day 1 to day 7, chronic post-surgical pain was assessed by telephone follow-up using numerical rating scale.
**Results and discussion:** In total, 12015 patients were included in the primary analysis. At the end of the follow-up, 1185 patients lost to follow-up. Patients in non-PCA group reported increased incidence of moderate-to-severe pain on post-operative day 3(6.5% versus 9.6%, p<0.001). Patients receiving non-PCA analgesia had increased mortalities on post-operative 60-day (1.02% versus 0.47%, p<0.001). The survival probability of patients in PCA group was statistically higher than those in non-PCA group [99.52%, 95%CI (99.34%-99.70%) versus 98.97%, 95%CI (98.73%-99.92%)]. Patient receiving non-PCA analgesia reported increased in-hospital major complications compared with (2.7% versus 1.9 %, p=0.003). Pain intensity was also assessed with visual analogue scale from post-operative day 1 to day 7, chronic post-surgical pain was assessed by telephone follow-up using numerical rating scale.
**Conclusion(s):** Intravenous patient controlled analgesia was related to improved survival, less complications and chronic post-surgical pain after major abdominal surgery, reiterating the important role of pain management for the prognosis of patients who underwent surgery.
**References:** Abbreviated
**Acknowledgements:** We thank the surgical staff and nursingstaff of the departments of orthopedics; vascular and thoracic surgery; general surgery; gynecologic& obstetrical department and; urological departments; the Department of Medical Information of The First Affiliated Hospital of Chongqing Medical University, Professor GetuZhaori, editor- in- chief of the Chinese Medical Journal (English Edition);Professor XiaoniZhong of The Biostatistics Department of Chongqing Medical University.

## 09AP02-11

### Evaluation the efficacy and side effects of postoperative analgesia in patients after orthopedic surgery

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**Background and Goal of Study:** Orthopedic surgery in adults needs an optimal postoperative pain management. In case of inadequate pain relief in 20% of patients after surgery may develop chronic pain (1). The aim of study was to evaluate the efficacy and side effects of postoperative analgesia in patients after orthopedic surgery.
**Materials and methods:** After obtaining written informed consent and local ethic committee approval 228 adults (aging 43.5±16.5, ASA I-II) scheduled for orthopedic surgery. Numeric rating scale (NRS), efficacy and side effects score (Kongsberg satisfaction score - KSS) and mobility degree will be registered every hour during the first 8 hours postoperatively (1). Postoperative pain was treated with doses of 100 mg tramadol i.m. on demand. *Data were processed unpaired t-test with Statistica 6.0 (StatSoft Inc., Tulsa, OK, USA); p<0.05 significant. Data are means ±SD.*
**Results and discussion:** Mean KSS was 18±*2* in the first hour after surgery. During the next 7 hours, it remained between 19 and 24 corresponding to good satisfaction. A slowly increasing degree of mobilization was revealed during the first 8 postoperative hours. By analyzing different types of anaesthesia for knee replacement, we found a higher KSS during the first 4 hours postoperatively

(p <0.05) after spinal anaesthesia as compared with total intravenous anaesthesia. NRS in second hour after spinal anesthesia (3.1±0.4) was lower than in patients after intravenous anaesthesia (5.9±0.9, p<0.05). Total analgetic consumption (tramadol) was higher in patients after general anaesthesia (50.1±5.8 mg vs 14.3±3.1; p <0.02) on the first day after operation.
**Conclusion(s):** Using KSS may be a useful for monitoring the status, efficacy and safety of postoperative pain control of orthopedic patients.
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## 09AP02-12

### Analgesia and postoperative pain in open prostatectomies

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**Background and Goal of Study:** Postoperative pain control remains still an unsolved problem, which results in prolonged hospital stay and increased costs. Pain management is a priority in delivering good care.[1]
The aim of this study is to compare postoperative pain with different analgesic techniques in patients undergoing open prostatectomy.
**Materials and methods:** Retrospective analysis of patients that underwent open prostatectomy in a central hospital during 2014. Anesthetic techniques were analyzed, the pain at admission and discharge from the recovery room, at 24 and 48 hours, and at discharge from the hospital. Statistical analysis was performed using SPSS Statistics® 23, percentages were used for categorical variables, mean with standard deviation (SD) or median with quartiles for nominal variables depending on normality. The Kruskal-Wallis and Mann-Whitney U tests were performed according to the characteristics of the variable and considered statistically significant with a p-value <0.05.
**Results and discussion:** We studied 137 patients, with a mean age of 66.1 years (SD 7.4), of which 83.2% underwent radical prostatectomies. Postoperatively analgesia was achieved with PCA (Patient-Controlled Analgesia) in 4.7%, DIB (Drug Infusion Ballon) in 35.4%, regional techniques in 8.7%, conventional analgesia in 51.2%. The pain scale data are shown in Table 1.

| | Pain at entrance into the recovery room | Pain at exit from the recovery room | Pain at 24 hours | Pain at 48 hours | Pain at discharge |
|---|---|---|---|---|---|
| Median | 3 | 0 | 1 | 0 | 0 |
| Percentile 25/ Percentile 75 | 0/5 | 0/0 | 0/2 | 0/2 | 0/2 |
| Minimum/Maximum | 0/10 | 0/3 | 0/8 | 0/5 | 0/3 |

*[Pain scale data]*

There were no statistically significant differences between the type of analgesia and the degree of pain control. Surgical wound infiltration with local anesthetic was performed in 24.2% of patients, resulting in no statistically significant differences in pain scales.
Postoperative pain after open prostatectomy is moderate/severe, self-limiting and short in duration.[2] The best pain therapy for patients undergoing prostatectomy is not yet defined, though there are many possibilities analgesic, with similar effects in our study.[3]
**Conclusion(s):** In conclusion, our study shows that no therapy is statistically superior with respect to pain management after open prostatectomies.
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## 09AP03-1

### Analgesic effect of light-emitting diode phototherapy on incised wound is via inhibiting IL-6, COX-2 and PGE-2 but not IL1-β and TNF-α

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**Background and Goal of Study:** Light-emitting diode (LED) phototherapy has been reported to relieve pain and enhance tissue repair through several mechanisms. The treatment of postsurgical pain remains a challenge for physicians. The analgesic effects of LEDs on incised skin wounds have never been examined. In this study, we examined the analgesic effects of LED therapy on skin incision pain and measured changes in cyclo-oxygenase 2 (COX-2), prostaglandin E2 (PGE2) and pro-inflammatory cytokines (interleukin (IL)-6, IL1-β, and tumor necrosis factor α (TNF-α)).
**Materials and methods:** The animal protocols were approved by the Institutional Review Board of I-Shou University, Kaohsiung, Taiwan. The rats were randomly assigned to different groups that received LED therapy on the skin 6 days before incision (LI group), 6 days after incision (IL group), or 3 days before incision and another 3 days after incision (LIL group). One group received only skin incisions (I group). Thermal hyperalgesia was tested 1 day after incision in the LI and I groups and after LED therapy in the other groups. After behavioral testing, the skin tissues were collected for COX-2, PGE2, IL-6, IL1-β and TNF-α protein analyses (n=6 each group).
**Results and discussion:** The thermal withdrawal latency was significantly decreased in the incision-only group (p=0.013) but not in the three LED treatment groups. Significantly decreased mechanical withdrawal thresholds were noted after skin incision in all LED treatment groups
(p<0.05). The expression of IL-6, COX-2 and PGE2 were significantly decreased in the three LED-treated groups compared to the I group (p<0.05). IL1-β and TNF-α were significantly decreased in the LI group (P=0.025 and 0.011, respectively) but not in the other two LED-treated groups.
**Conclusions:** LED therapy relieved thermal hyperalgesia but not mechanical allodynia in incised wounds, and this analgesic effect was possibly produced by the inhibition of IL-6, COX-2 and PGE2 expression. Preemptive LED phototherapy was able to transiently suppress the expression of IL-1ß and TNF-α one day after incision. LED phototherapy was not able to suppress the expression of IL-1ß and TNF-α 4 days after the incision. LED therapy has therapeutic potential for the treatment of post-surgical pain.
**Acknowledgements:** This work was supported by National Science Council Grant MOST 103-2314-B-214-003-MY3, and E-Da Hospital Grant EDRJ 103054, 103055, and EDAHP 104028. Taiwan

## 09AP03-2

### Antinociceptive activity of black raspberry (Rubus occidencalis L.) extract in a rat model of incisional pain

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**Background and Goal of Study:** The aim of this study was to assess whether intraperitoneal administration of *Rubus occidentalis* extract (ROE) has the antinociceptive effect in a rat model of postoperative pain and to examine the possible mechanism involved.
**Materials and methods:** Adult male Sprague-Dawley rats were used, and a rat model of postoperative pain was made by plantar incision. 30 rats, in either experiment 1 or 2, were randomly assigned to 5 groups. For experiment 1, two hours after plantar incision, rats were injected intraperitoneally with a 0.9% saline (control group) or various doses of ROE (POST-ROE 10, 30, 100, and 300 mg/kg groups). For experiment 2, 30 minutes before planar incision, rats were injected intraperitoneally with a 0.9% saline or various doses of ROE (PRE-ROE 10, 30, 100, and 300 mg/kg groups). In experiment 3, 42 rats randomly assigned to 7 groups. Two hours after plantar incision, rats were injected intraperitoneally with 300 mg/kg of ROE. Ten minutes before ROE administration, yohimbine, dexmedetomidine, prazocin, naloxone, atropine, and mecamylamine were injected intraperitoneally in each group. For three experiments, the mechanical withdrawal threshold (MWT) was evaluated with von Frey filament at various time points.

**Results and discussion:** The MWTs were significantly increased at 15 min after post-incisional administration of 300 mg/kg of ROE compared to that in control group, and this elevation was observed for up to 45 minutes (Fig.1). Overall, elevated MWTs were in proportional of the dosage of ROE. On the other hand, ROEs administered before the plantar incision showed no significant change in the MWT. The antinociception of ROE was significantly antagonized by mecamylamine, and yohimbine and agonized by dexmedetomidine.
**Conclusions:** Intraperitoneal administration of ROE after surgery induces antinociceptive effects in a rat model of postoperative pain. The effects on mechanical hyperalgesia may be associated with cholinergic and alpha-adrenergic receptors.
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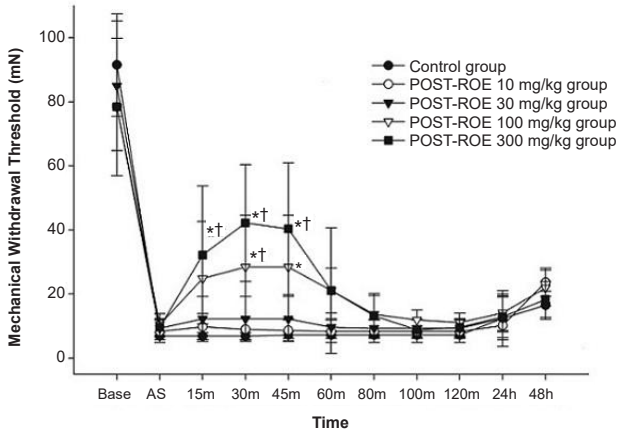


AS: After Surgery
* P<0.05 compared to the MWTs in control group
† P<0.05 compared to the MWTs at AS

*[Figure 1]*

## 09AP03-3

### Procaine and saline have similar effects on articular cartilage and synovium in rat knee

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**Background and Goal of Study:** Intraarticular local anesthetics are widely used for providing postoperative analgesia and decreasing the need for opioids (1). Procaine has proven positive effects in carpal tunnel syndrome and chondromalasia patella (2). In vitro studies also showed that procaine and its metabolite dietilaminoethanol (DEAE) decrease the formation of free oxygen radicals in leucocytes (3). However, the effects of procaine on articular cartilage and synovium has not been studied yet. The aim of this study was to evaluate the effects of intraarticular procaine injection on the articular cartilage and synovium.
**Materials and methods:** Twenty adult Spraque-Dawley rats were enrolled in the study. After providing anesthesia and aseptic conditions; 0.25 ml 10% procaine was injected to the right knee joint and 0.25 ml normal saline (control group) was injected to the left knee joint. Knee joint samples were obtained from 4 rats in each group after appropriate euthanasia on days 1, 2, 7, 14 and 21. The histological sections of the articular regions and synovium were evaluated by two histologists and inflammatory changes were graded in a blinded manner.
**Results and discussion:** There were no significant differences of inflammation between procaine and saline groups in any time interval. Slight inflammatory infiltration due to injection was seen in both groups on the 1st day. Hemorrhage was more prominent on the 2nd day in procaine group but this difference was not statistically significant (p=0.057).
**Conclusion(s):** Injection of procaine seems safe to use intraarticularly in this in vivo study on rat knee cartilage. However, further studies investigating both the analgesic and histopathological effects of procaine on damaged articular cartilage and synovium models are needed.

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## 09AP03-4

### The central nervous system penetration of dexketoprofen and etoricoxib

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**Background and Goal of the Study:** Non-steroidal anti-inflammatory drugs are highly effective in early postoperative pain. In postoperative pain management the onset of analgesic action of etoricoxib is relatively slow (1). That could be due to delayed central nervous system penetration. Dexketoprofen permeates blood-brain-barrier readily and its analgesic action is fast (2). To test this hypothesis we designed the present randomised clinical trial where the primary aim was to compare the CNS penetration of dexketoprofen and etoricoxib in patients having elective primary total hip arthroplasty (THA).
**Material and methods:** The study was approved by the local Research Ethics Committee and Finnish Medicines Agency was notified. After informed written consent a total of 24 patients, aged 40-75 yr., scheduled for THA were enrolled. After the surgery 12 of them received a single iv-dose of dexketoprofen (0.5 mg/kg, maximum dose 50 mg), and 12 subjects 1-1.2 mg/kg of etoricoxib by mouth. A paired blood and cerebrospinal fluid (CSF) samples were taken up to 24 h for drug concentrations. The intensity of postoperative pain was recorded during the first 24 postoperative hours.
**Results and discussion:** Dexketoprofen was detected in CSF in 9/11 subjects at 30 minutes and in all subjects at 60 minutes after administration, compared to etoricoxib with 7/12 subjects at 30 minutes and 8/12 subjects at 60 minutes, respectively. The median $C_{maxCSF}$ of dexketoprofen was 4.0 ng/ml [minimum-maximum, 1.9-13.9] and $t_{maxCSF}$ 3 h [2-5], and for etoricoxib $C_{maxCSF}$ 73 ng/ml [36-127] and $t_{maxCSF}$ 5 h [1-24], respectively. Cumulative opioid consumption during the first 24 postoperative hours was similar in the two groups. No significant differences in pain relief or adverse events were noted between the two groups.
**Conclusion:** Dexketoprofen and etoricoxib entered the CNS readily, already at 30 minutes after drug administration both compounds were detected in CSF in most subjects. A single dose of dexketoprofen and etoricoxib provided a similar pain relief after major orthopaedic surgery.
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## 09AP03-5

### Time course of copeptin during experimental pain

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**Background and Goal of Study:** Pain sensing, conduction, and processing are complex mechanisms and a reliable biomarker to objectively measure pain has yet to be found. Copeptin is a novel and easy-to-measure surrogate marker of arginin-vasopressin, a stress hormone of the hypothalamo-pituitary axis.

We hypothesize that as pain is a strong sympathetic stress stimulus, copeptin concentrations should increase following sustained acute pain.
**Materials and methods:** In this secondary analysis,(1) we measured the time course of copeptin in an established experimental pain model simulating surgical wound pain in healthy volunteers.(2) The pain model foresaw a 15 minute calibration period creating a numeric rating scale (NRS) pain score of 6 out of 10 points (0=no pain; 10=worst possible pain), followed by 120 minutes of sustained electrical stimulation. Thereafter, electrical stimulation ceased. Copeptin and cortisol were measured at baseline (-15min.), after electrical stimulations (120min.), and after a period of rest (270min.).
**Results and discussion:** Copeptin concentrations increased significantly from baseline to 120 minutes (P = 0.001) with medians of 6.2 pmol/L (IQR 3.3 to 8.7pmol/L) and 37.9 pmol/L (IQR 8.1 to 62pmol/L), respectively. Furthermore, copeptin levels decreased following a period of rest to 17.9 pmol/L (IQR 6.4 to 25.6), which was significantly lower than at 120 minutes (P = 0.003), but still above baseline (P = 0.002).
**Conclusion(s):** Following sustained acute pain, copeptin concentrations significantly and impressively increased. Pain levels should be considered when interpreting copeptin concentrations for clinical purposes.
**References:**
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**2.** Koppert W, Dern SK, Sittl R, Albrecht S, Schüttler J, Schmelz M. A new model of electrically evoked pain and hyperalgesia in human skin: the effects of intravenous alfentanil, S(+)-ketamine, and lidocaine. *Anesthesiology.* 2001;95(2):395-402.

## 09AP03-6

### Pupillometry and analgesia nociception index (ANI) utility during epidural and general anaesthesia

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**Background:** Optimizing an adequate level of analgesia at the right time is a challenge for the anaesthesiologist and an indicator of good quality care. New monitors have been proposed based on the sympathetic (pupillometry) and parasympathetic (Analgesia Nociceptive Index ANI®) nociceptive response.
**Case report:** Female, 36 years old, ASA I. Previous history of right femoral nerve lesion after a previous surgical intervention of a retroperitoneal femorocutaneal nerve schwannoma and scheduled for nerve surgical reconstruction. General anaesthesia combined with epidural technique at L4-L5 level (initial bolus of 10 ml L-Bupivacaine 0.5% was administered, and a 0,25% l-bupivacaine infusion was maintained at a 10ml/h rate). TIVA-TCI of propofol and remifentanil (Ce 2.5 mcg/ml and 2 ng/ml respectively) plus rocuronium boluses were administered according to a neuromuscular monitor (Veryark TOF®). Algiscan® pupillometer (pupil diameter variation with induced or surgical stimulus) and ANI® monitoring (heart rate variability) to assess analgesia levels were used. Both systems showed good levels of analgesia at baseline and during surgery (RDP pupilometry: null during first incision; PPI in axillary electrodes: 5-7 with 17-54% variability); ANI (80-96), making it possible to reduce remifentanil from 2.5 to 1.5 ng/ml Ce. BIS (Bispectral Index) values didn't exceed 40-60, and the patient remained hemodynamically stable. The epidural infusion was maintained at a rate of 7 ml / h for four days after surgery without any needs of extra opioids (EVA score: 0).
**Discussion:** Pupillometry and ANI allowed to anticipate and determine an adequate analgesia during surgery, thus allowing to use lower doses of remifentanil. It could also help to assess a satisfactory epidural technique under general anaesthesia. Remifentanil doses were better adjusted following the variations of ANI monitor (1). Other studies showed that pupillometry might reduce pain and analgesic consumption in the postoperative period (2).
**References:**
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**Learning points:** ANI and pupillometry RDP could be useful to test the efficacy of epidural blocks during general anaesthesia. Pupillometry PPI and tetanus could predict response to noxious stimuli. ANI could monitor level of nociceptive response continuously.

## 09AP03-7

### Measurement of pain in labor with the use of different scales of pain and the Analgesia Nociception Index (ANI)

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**Background and Goal of Study:** Pain during labor is the most influential factor in the overall satisfaction of the pregnant, although this is widely known the literature and studies have insufficient attention on how to measure or assess pain. The scales used more and have better sensitivity when measuring acute pain are first the Visual Analogue Scale (VAS) followed by verbal numeric scale (NRS). These scales have the advantage that they are easy to use but have some disadvantages, both are not very specific and in the case of VAS patients find it difficult to interpret. The purpose of this study is to measure the pain of the pregnant patient during labor as well as relief achieved with epidural analgesia using the common scales (VAS-NRS) and oriented scale designed by the authors call GALYCO. It is a visual and verbal scale with eleven points (0-10 with four examples of pain inbetween). We also use the variation of ECG beat RR measured by the ANI monitor.
**Materials and methods:** 60 pregnant patients were studied. Verbal and writing consents were obtained during the pre-anesthesia visit at the 32nd week of pregnancy. When the patient began with labor, before and after epidural anesthesia was performed; in a randomized manner the three scales and ANI monitor were evaluated. The results were divided into four categories: no pain - mild, moderate and severe pain and compare between the four methods. Overall satisfaction as the easiest scale of interpreting was assessed.
**Results and discussion:** No statistically significant differences were found in the comparison between NRS, ANI and GALYCO (0.325); But if there were statistically significant differences in the comparison between the VAS and NRS GALYCO ANI (0.001) in both measure before and after epidural anesthesia. The scale preferred by patients to express their grief was GALYCO a 76'7%, with 23.3% NRS, while VAS had a score of 0%.
**Conclusion:** We believe that the pain scales have to adapt to the social environment in which they are used to achieve a better understanding by the patient achieving a more accurate measurement. In this study it was found that there is a good correlation between NRS ANI GALYCO and not with the VAS. This last patient finds difficult to interpret and in this study tended to overdosing pain. On the other hand ANI showed a good correlation with pain scales and while there may be interference with the awake patient, it could be a useful and complementary tool for pain evaluation.

## 09AP03-8

### Nociceptive and psychological prediction of pain after total knee arthroplasty

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**Background:** Total knee arthroplasty (TKA) results in moderate to severe pain in 75% of patients on the first postoperative day and in 30-40% after 2 weeks with implications for recovery and correlation to the development of persistent postsurgical pain conditions. Preoperative identification of high pain responders could potentially lead to an improved individualized stratified analgesic strategy, with intensified analgesic interventions in high pain responders, and subsequent reduced use of analgesics in low pain responders. The aim of this study was to describe predictive preoperative nociceptive and psychological factors for acute post-op pain using simple clinical tests and questionnaires.
**Methods:** 60 consecutive patients were included in a prospective descriptive study. Data on predictive variables was collected prior to surgery and included demographics, nociceptive testing (pressure pain-, cold pressure- and pain matcher test) and psychological profile (pain catastrophizing scale (PCS) and hospital anxiety and depression scale (HADS)). Primary outcome measure was pain during walk 24 hrs. post-op.
**Results:** Median age was 68 years and the male / female ratio 24:36. Significant nociceptive and psychological predictive factors for moderate-severe pain in univariate analyses were reduced pressure pain threshold (PPT) on the arm (p=0.004), on the knee-to-be-operated (p=0.0046), on the contralateral knee (p=0.003) and increased PCS (p=0.017). Results were confirmed in the backwards logistic regression analyses, where reduced PPT on the

arm (p=0.007) and increased PCS (p=0.026) were predictive variables in the final model (R-square 0.21). Estimated odds ratios were 0.672 for a 50 kPa increased PPT and 1.356 for a 5 points increased PCS score. In the receiver-operator characteristic analyzes, the area under the curve was 0.77 (95% CI 0,65-0,89) with overall best performance of sensitivity and specificity at cut off values of PPT ≤ 245 kPa and PCS ≥ 8 points (sensitivity 71.4, specificity 62.5). In conclusion, reduced PPT on the arm (general sensitization) and increased PCS (reduced pain coping capability) were significantly predictive factors for moderate-severe pain during walk 24 hours post-op, but only partly explanatory for the observed variability in pain response. Our model should be considered in future studies on risk-based individualized stratified analgesic strategies, especially when focusing on preoperative interventions in high risk patients.

## 09AP03-9

### A randomized, controlled, parallel group, multicenter, pivotal study to assess the safety and effectiveness of the epidural space verification with the CompuFlo® Epidural Computer Controlled System (CompuFlo)

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**Background and Goal of Study:** Successful and safe performance of epidural anesthesia or epidural injections relies on correct identification of the epidural space. While methods for simple and objective identification of the ES have been proposed, most anesthesiologists and/or pain physicians still utilize either the subjective manual feeling of a loss of resistance (LOR) or objective but relatively invasive radiological confirmation via fluoroscopy (1). Primary objective of the study was to determine whether the success rate of performance of lumbar epidural anesthesia with the CompuFlo to identify the epidural space is equivalent to to performance of lumbar epidural anesthesia with the loss of resistance technique (LOR) to identify the epidural space.
**Materials and methods:** Study was designed by Scientific Advisory Board as prospective, randomized, open label and approved by the IRB/EC and the U.S. Food and Drug Administration (FDA), to assess the safety and effectiveness of the CompuFlo, pressure sensing technology in identification of the epidural space when compared to standard of medicine as part of the acute and chronic pain management. Patient randomization was stratified according to body mass index (BMI), success of the procedure was verified with the correct spread of dye demonstrated by fluoroscopy as determined by the independent observer and the patient outcome were assessed utilizing Patient's Global Impression of Change (PGIC)Scale (2).
**Results and discussion:** This is a preliminary report of 219 subjects enrolled in the study for whom epidural procedure was needed as part of the chronic pain management.

| | Standard/ LOR | Compuflo | *P* value |
|---|---|---|---|
| N | 105 | 114 | |
| Median Age (IQR) — yr | 59 (50-66) | 56 (47-64) | 0.34 |
| Gender Male — no. (%) | 44 (42%) | 54 (47%) | 0.50 |
| Race White — no. (%) | 93 (89%) | 98 (89%) | 1.00 |
| BMI ≥ 31 — no. (%) | 73 (70%) | 76 (67%) | 0.67 |
| Success — no. (%) | 105 (100%) | 114 (100%) | 1.00 |
| Median PGIC (IQR) | 5.0 (4.0-5.0) | 4.5 (2.8-5.0) | 0.11 |

This initial data suggest that identification of the epidural by utilizing a computerized injection pump technology and obtaining real-time pressure measurements from the needle tip, results in equivalent success rate, outcome and safety when compared to fluoroscopy.

## 09AP03-11

### Audit of outcomes after open abdominal gynaecology surgery in patients given a general anaesthetic (GA) and a subarachnoid block (SAB) with intrathecal opioid compared with patients not treated with a SAB, in a large tertiary-referral teaching hospital

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**Background:** A survey of Anaesthetists involved in Open Abdominal Gynaecology Surgery showed that 66% used a SAB followed by a GA, while 44% gave a GA with no SAB. Previous audits [1,2] had shown that patients who received SAB had a decreased hospital stay, earlier mobilisation and better satisfaction scores .
An Enhanced Recovery After Surgery (ERAS) programme for Gynaecology is being planned by the health board.
**Aim:** To audit how Anaesthetic Technique affects patient outcomes.
**Method:** Over a period of 6 months, Anaesthetists filled in an audit form about their Anaesthetic Technique for Open Abdominal Gynaecology Surgery. Nursing staff collected outcome data on another form.
**Results:** 109 patients, 47 had a SAB with Intrathaecal opiate and a GA (Spinal Group) and 62 had a GA with no SAB (GA Group). Mean maximum pain scores over 24 hours were 4.7/10 in Spinal Group and 5.6/10 in GA group. This did not reach statistical significance. The median Morphine requirement of the Spinal Group was 23 mgs, for the GA Group it was 40 mgs (P value 0.0941). Opiate induced side effects (nausea, vomiting and sedation) were not significantly different between groups. There was no difference in time taken to mobilise patients or the length of hospital stay between the two groups. The Spinal Group tended to have better satisfaction but this was not statistically significant.
**Discussion:** Anaesthetic technique does not seem to affect pain scores significantly and opiate usage over 24 hours was not significantly different. An explanation could be the large variation in Anaesthetic techniques, as well as different operations included in the audit. Patients are rarely mobilised on the day of surgery, this is most likely due to local nursing practice. The fact that PCA Pumps were prescribed in 81% of patients may contribute.
**Conclusion:** We cannot conclude that one anaesthetic technique provides better outcomes than the other. There is a trend towards the Spinal Group using less opiate over 24 hours and having lower pain scores. Further data is needed to better inform the optimal anaesthetic technique to implement ERAS in the hospital.
**References:**
1. *S. Sullivan et al.* Outcomes after hysterectomy in patients treated with general anaesthesia (GA) and spinal compared with patients without spinal anaesthesia. 2014 SSAPS
2. *A.Singh et al.* Outcomes of hysterectomy in patients treated with GA and SAB in comparison to patients without SAB. 2015 SSAPS.

## 09AP03-12

### Evaluation of three intervention to reduce emergency department utilization following tonsillectomy

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**Background:** Patients undergoing tonsillectomy may suffer acute postoperative pain up to 14 days.In selected patients the surgery is performed on an outpatient basis but pain related complications are common and they need emergency department (ED) treatment for pain and / or dehydration. Bleeding is also a common cause of consultation after this procedure. we observe if a particular perioperative analgesic and home treatment, associated with educational interventions can reduce the rate of ED consultation.
**Methods:** Three main interventions are performed:
1-Pre and postoperative education including detection of alarm signs, need to take prescribed drugs and type of food that patients should eat (soft diet and cold liquids) 2-Adequate perioperative analgesia (adding dexamethasone

0.5mg /kg) 3-Changing the home analgesic regimen for maximum drug efficacy during ingest: acetaminophen an hour before meal and ibuprofen 30 minutes before meal.
We retrospectively compare the rate of ED consultation related to post-tonsillectomy pain and bleeding causes. all consultations for these causes are collected one year (2014) before implementing these new interventions and one year (2015) after implement them.Data are compared using chi-square test using SPSS V22 (IBM).
**Results and discussion:**
Implemented interventions during 2015 compared to 2014 appears to reduce a 22% pain consultation rate.However the sample size accumulated to date does not allow finding significant differences, being necessary to increase it to n=800 to confirm this hypothesis.Bleeding does not seem to increase with this interventions as evidenced in other articles (1, 2)

| | TYPE OF CONSULTATION | |
|---|---|---|
| YEAR | PAIN | BLEEDING |
| 2014 | 12,9% (22/171) | 7,0% (12/171) |
| 2015 | 9,4% (9/96) | 8,3% (9/96) |
| $\chi^2$ | 0.39 | 0.69 |

*[Consultation rate to the emergency department (ED)]*

**Conclusion:** Apply educational interventions as well as modify analgesic drugs regimen could reduce the rate of pain consultation at ED, further studies with larger sample size are guaranteed.
**References:**
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2. Bedwell JR et al. Ibuprofen with acetaminophen for postoperative pain control following tonsillectomy does not increase emergency department utilization.Otolaryngol Head Neck Surg. 2014 Dec;151(6):963-6

## 09AP04-1

### Labour analgesia: knowledge, acquired information and choice of parturient

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**Background and Goal of Study:** Changing social values and medical technology have influenced birth-related pain management options and choices. It is recomended that the method used for analgesia should be individualised to each woman's wishes, needs and circumstances. A woman's lack of knowledge about the risks and benefits of the various methods of pain relief can heighten anxiety. Midwive is a reliable source of information about labour analgesia.
**Materials and methods:** A prospective cohort study was carried at 2015 08-09 in a teaching hospital.The qestionnaires were given to all parturients after delivery.
**Results and discussion:** 110 questionnaires were given, returned - 104, the response rate was 96%. Parturients knowledge about labour analgesia (self-assessment): sufficient - 73.1% (n=72), insufficient - 15.4% (n=16), didn't know anything 11.5% (n=12) ($\chi^2$=0.233, p=0.248).
Known natural pain relieving methods were:
breathing exercises for 89.4% (n = 93) of parturients,
physical activity for 72.1%,
massage - 68.3% (n=71),
hidrotherapy - 28.8% (n=30),
acupuncture - 11.5% (n=12),
acupressure - 10.6% (n=11),
application of hot and cold compresses to the perineum - 8.7% (n=9).
Known pharmacological labour analgesia methods were epidural analgesia for 90.4% (n = 94) of parturients,and 80.8% (n=84) consider it as most effective, spinal analgesia for 49.0% (n=51) and nitrous oxide for 42.3% (n=44) of parturients.

| | Possible pain relief methods | Advantages and disadvantages | |
|---|---|---|---|
| | | Natural analgesia | Pharmacological analgesia |
| Sufficient information | 36.5% | 22.1% | 36.6% |
| Partial information | 20.2% | 22.4% | 57.7% |
| Not provided | 43.3% | 53.8% | 8.7% |
| p | 0.248 | 0.007 | 0.007 |
| $\chi 2$ | 0.233 | 0.533 | 0.146 |

*[Information provided by midwives for parturients]*

Choise of parturients: 54.8% (n=57) pharmacological labour analgesia, 45.2% (n=47) natural methods. Most of the parturients - 95.2% (n=99) - will chose the same method during next delivery.
The choice of labour analgesia method is determined by the fear of labour pain 54.8% (n=57) and fear to make harm for baby 53,8% (n=56).
**Conclusion(s):** Almost all women knew epidural labour analgesia, but they knew just a few natural methods. Most parturients didn't get enough information about advantages and disadvantages of different labour analgesia methods. More information should be provided by midwives during pregnancy. The choice of analgesia method is affected by a fear of pain and fair to make a harm for baby mostly.

## 09AP04-2

### Incidence of postoperative delirium in surgical patients receiving intravenous patient-controlled analgesia

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**Background and Goal of Study:** Postoperative delirium (POD) is associated with longer hospital stay, higher medical cost and mortality. Severe pain is a risk factor of POD and better pain control can lower POD incidence and severity. Intravenous patient-controlled analgesia (IV-PCA) is widely used to reduce pain. However, research concerning POD in IV-PCA patients is limited. We aimed to assess the incidence, risk factors and characteristics of POD in IV-PCA patients.
**Materials and methods:** A prospective, observational study was conducted in IV-PCA patients ≥60 receiving general anesthesia from 2012 to 2013. Acute pain service team recorded the Nursing Delirium Screening Scale (NuDESC), pain severity at rest/on movement and side effects of IV-PCA during 3 postoperative days twice daily. Patients were categorized as adequate and inadequate pain relief. An 11-point numeric rating scale (NRS) of 3 or less was considered adequate while >3 considered inadequate.
**Results and discussion:** We recruited 1,608 surgical patients receiving IV-PCA. POD incidence (NuDESC ≧1, N=35) was 2.1%. Age ≧80 and the high ASA status (III and IV) were risk factors of POD. Approximately 77.2% of POD occurred on postoperative days 1 and 2. Patients with inadequate rest pain relief (NSR >3) on postoperative days 1 and 2 had higher POD incidence than those with adequate rest pain relief (day 1, 8.4% vs 1.5%, $p<0.001$; day 2, 9.6% vs 2.0%, $p=0.028$). Patients with inadequate rest pain relief on postoperative day 3 had a higher POD incidence (4.1%) than those with adequate rest pain relief (2.1%) ($p=0.412$). There was no significant difference in POD incidence between patients with inadequate and adequate movement-evoked pain reduction. Recorded NuDSEC symptoms included disorientation (N=23, 65.7%), illusion/hallucination (N=13, 37.1%), inappropriate communication (N=11, 31.4%), inappropriate behavior (N=9, 25.7%) and psychomotor retardation (N=5, 14.2%). Nighteen patients (54.2%) showed 1 symptom and 9 patients (25.7%) showed 2. Approximately 71.4% of POD cases had low NuDSEC scores (≦2). IV-PCA patients with inadequate postoperative rest pain relief had increased POD risk while ones with inadequate movement-evoked pain relief did not. About 80% of POD patients had either one or two symptoms.
**Conclusion:** POD incidence was low in IV-PCA patients. Patients with adequate rest pain relief had lower POD incidence. Most POD patients had 1 or 2 NuDSEC symptoms.

## 09AP04-3

### Prevalence of acute pain intensity and evaluation of risk factors after elective Percutaneous Coronary Intervention (PCI) in Hospital of Lithuanian University of Health Sciences Kaunas Clinics (LUHSKC)

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**Background and Goal of Study:** Acute pain after PCI is underestimated problem, which has a lack of attention. In this study we report the prevalence and risk factors for acute pain after PCI procedure.
**Materials and methods:** The data of randomly selected patients who underwent elective PCI using trans radial or trans femoral approach in Hospital of LUHSKC Cardiology department from March to April of 2015 was collected. Patients were questioned according to survey made by authors. Pain intensity was evaluated according to verbal analogue scales (no pain-NP, mild-mP, moderate-MP severe-SP, very severe-VSP and worst possible pain-WPP) 2,12,24 and 48 hours after PCI. Data analysis was performed with SPSS 23.0, ($p<0.05$).
**Results and discussion:** This study includes 191 participants, 122 males and 69 females, who were examined first 48 hours after PCI. Patients mean age - 67.3±10.49 yr. 150 patients (78.53%) were catheterized via radial, 41 patients (21.47%) via femoral artery.
There was no statistically significant relation of results comparing between these approaches. 102 participants (53,4%) felt acute pain at least one time during first 48h. 44 patients (23,04%) felt pain immediately after PCI: 13,64% of them experienced mP, 43,18 % MP, 29,55 % SP, 6,82 % VSP, 6,82 % WPP. 90 patients felt pain after 2h after PCI: 13,33% of them experienced mP, 37,78% MP, 24,44% SP, 15,56% VSP, 8,89% WPP. 62 patients (32,46 %) felt pain after 12h following PCI: 38,71 % of them experienced mP, 37,10 % MP, 14,52 % SP, 3,23 % VSP, 6,45 % PP. 28 patients felt pain after 24h after PCI: 39,29% of them experienced mP, 28,57% MP, 17,86% SP, 10,71% VSP, 3,57% WPP. 18 patients felt pain after 48h following PCI: 33,33% of them experienced mP, 33,33% MP, 11,11% SP, 16,67% VSP, 5,56% WPP. 18 patients (9,42%) still felt pain after 48h.
Factors that statistically significantly affect the manifestation of acute pain are arterial hypertension (OR 2,39 (95% CI 1,17-4,89)), female gender (OR 2,14 (95% CI 1,16-3,93)), hematoma (OR 3,45 (95% CI 1,75-6,82)), arterial bleeding (OR 5,33 (95% CI 1,50-18,97)).
**Conclusion:** This study revealed that more than half patients after PCI are suffering from acute post procedural pain. In most cases pain was moderate. Arterial hypertension, female gender, hematoma and arterial bleeding are statistically reliable causes for acute pain manifestation after PCI during first 48 hours.

## 09AP04-4

### Clonidine versus morphine as additives to bupivacaine in patient-controlled epidural analgesia for postoperative pain after abdominal hysterectomy

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**Background and Goal of Study:** We planned this study to compare in terms of analgesic effect and safety, the value of clonidine and morphine used as adjuvants to local anaesthetic, in patient-controlled epidural analgesia (PCEA) after abdominal hysterectomy with midline laparotomy.
**Materials and methods:** After Ethics Committee approval and written informed consent, 85 ASA I-III women, (aged 30 to 75 years) scheduled for abdominal hysterectomy under general anaesthesia, were enrolled into a randomized, double-blind, prospective study. Patients were preoperatively supplied with a lumbar epidural catheter. Postoperatively, patients were randomly assigned into two groups and PCEA was initiated for the first 24h post-procedure according to the following protocols: 0.125% bupivacaine plus clonidine (1 μg/ml) in group C (n=42), respectively 0.125% bupivacaine plus morphine (0.1 mg/ml) in group M (n=43), using the same administration regimen (10 ml loading dose, 5 ml bolus dose, 15 min lockout period, 30 ml limit in 4h). Rescue analgesia was given with 1mg/kg iv diclofenac.
The primary outcomes during first 24h postoperatively were the quality of pain control measured six-hourly by VAS at rest and after coughing, time to first bolus request, total analgesic consumption through epidural catheter and consumption of rescue analgesic. The secondary outcomes were hemodynamic status, the incidence of sedation and nausea/vomiting events and patient satisfaction. Statistics was made with Mann-Whitney, T-test and Chi-square test ($p<0.05$).
**Results and discussion:** Demographics was similar in our groups. According to VAS scores, postoperative pain was significantly better controlled at rest and after coughing in group C compared to group M ($p<0.05$). Time to first bolus request was prolonged in group C ($p<0.05$). Total analgesic consumption through epidural catheter and iv rescue analgesic requirements were significantly less in group C ($p<0.05$). Group C had a considerably more stable hemodynamic status versus group M ($p<0.05$). Patients in group C experienced lower incidence of sedation and nausea/vomiting ($p<0.001$).
The rate of patient satisfaction was significantly increased in group C versus group M ($p<0.05$).
**Conclusion(s):** Clonidine could be an effective analgesic adjunct to epidural bupivacaine, providing pain relief and safety profile superior to those registered for combination bupivacaine and morphine, in PCEA during first 24h after abdominal hysterectomy.

## 09AP04-5

### Intraoperative infusion of dexmedetomidine reduces postoperative analgesic requirements

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**Goal of Study:** This prospective, randomized, double-blind pilot study was designed to assess whether intraoperative infusion of dexmedetomidine (Dex) (an α2 agonist) provides effective postoperative analgesia after total abdominal hysterectomy[1].
**Materials and methods:** After institutional approval and informed consent, 22 women, ASA I-II randomly assigned to two groups. Group D (n=11) received a loading dose of Dex 1$\mu g \cdot kg^{-1}$ iv, 15 min after induction of anaesthesia followed by a continuous infusion at a rate of 0.4 $\mu g \cdot kg^{-1} \cdot hr^{-1}$ throughout the operation. Group P (n=11) received the same bolus volume and infusion of placebo (0.9% saline). The induction of anaesthesia was the same for all pts and was maintained with desflurane, $O_2/N_2O$ ($FiO_2$=0.4) around a bispectral index value of 40. For each case, systolic, diastolic and mean arterial blood pressure (SAP, DBP, MAP), heart rate (HR), peripheral oxygen saturation, were recorded intraoperatively and registered for 48h after surgery. A patient-controlled analgesia pump was applied to all pts after surgery with a bolus dose of 15 mg of tramadol and lock out time of 10 min. Time to extubation, time of first analgesic request, cumulative tramadol consumption, verbal numeric pain score (VPS) at rest (0-10), Prince-Henry Pain Scale (0-4)[2] in movement, sedation with Ramsay score (0-4), nausea (0-3), time to extubation were recorded also in post-anaesthesia unit at 0,15,30,45,90,120 min and at the ward 4,8,16,24,48 h. Statistical significance ($p<0.05$) was determined using t-test and Mann-Whitney (U) test.
**Results and discussion:** The 2 groups were similar regarding: the demographics, the mean time to extubation from anaesthesia, the nausea and sedation scores at all times. VPS in the first 90 min was significantly lower in group D 2.9±1.8 vs P=5.9±0.8 (p=0.001). The time of first analgesic request was significantly higher in group D 192.45±49.2 vs P=19±30 min (P=0.001). Total tramadol consumption was significantly lower in group D at 24 and 48h, 262.2±102 and 336.8±146.6 mg vs 349.4±115 and 485±165 mg in group P respectively. A statistically significant reduction of intraoperative MAP and HR occurred in group D, though without clinical importance.
**Conclusion:** Continuous i.v. Dex during abdominal hysterectomy significantly reduced postoperative tramadol consumption and the time of first analgesic request.
**References:**
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## 09AP04-6

### Posterior Reversible Encephalopathy Syndrome (PRES) in the postpartum after postdural puncture headache

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**Background:** Posterior Reversible Encephalopathy Syndrome (PRES) is rare and characterized by insidious onset of headache, altered mental status, seizures and cortical blindness with posterior leukoencephalopathy on imaging studies.[1] Incidence and pathophysiological mechanism areunknown. It has been associated with hypertensive encephalopathy, immunosuppression and postpartum eclampsia[2].
We describe a case of PRES associated with postdural puncture headache (PDPH).
**Case report:** 25YO female, ASA1.PDPH following epidural analgesia for labour.Headache improved after 4 days of conservative treatment. Hospital discharge.2 days after, readmission: generalized tonic-clonic seizure, bilateral amaurosis and headache (no longer postural).Acute Pain Unit activated. Cerebral computed tomography scan(CT):bilateral occipital hypodensities; Venous-CT excluded thrombosis. Brain magnetic resonance(MR) imaging: hyperintense areas on T2/FLAIR within the bilateral parietooccipital lobes with vasogenic edema; patchy left parietal area with cytotoxic oedema. MR angiography: arterial vasospasm, especially at posterior circulation, and subdural effusions.
**Treatment:** Dorsal decubitus at 0º, hydration, paracetamol, nonsteroidal anti-inflammatory drug, caffeine and nimodipine. She remained hemodynamically stable; clinical and imaging improvement. After complete recovering from blindness she was discharged. She remained asymptomatic at six month and one year evaluation.
**Discussion:** In this case clinical symptoms and neuroimaging findings are compatible with PRES.
The exact PRESmechanism remains unknown. The temporal association of encephalopathy with diffuse cerebral vasospasm after an episode of PDPH may be causative.
Prompt recognition and treatment are crucial to avoid the permanent damage leading to sequelae and mortality.
**References:**
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2. H Chiu-Ming, C Kwok-Hon.*Posterior Reversible Encephalopathy Syndrome with Vasospasm in a Postpartum Woman After Postdural Puncture Headache Following Spinal Anesthesia.* AnesthAnalg 2007; 105:770-2.
**Learning points:** PRES is a possible complication of postdural puncture. It must be early diagnosed and properly treated.

## 09AP04-7

### Correlation between postoperative pain and patient satisfaction

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**Background and Goal of Study:** Most patients are expecting to experience postoperative pain and no significant relief with analgesia.[1,2]
Moderate to severe postoperative pain remains a clinical problem but most patients refer being satisfied with their postoperative pain management.[1,2,3]
Our study sought to determine whether there is a relationship between postoperative pain experienced by patients scheduled to elective surgery at a university hospital and their satisfaction with pain management.
**Materials and methods:** In this prospective observational study we administered a questionnaire to all patients undergoing elective inpatient surgery on 3 random non-consecutive days, after ethical committee's approval. We ascertained patient satisfaction with their pain management (using a Likert scale). The pain at rest and dynamic dynamic pain were assessed at 4, 24 and 48 hours postoperatively, as well as the worst pain experienced in between, using a numeric scale from 0 to 10.
The Spearman correlation and Friedman test (with pairwise multiple comparisons) were used to compare the variables (statistical significance $p<0,05$).
**Results and discussion:** There were 115 scheduled surgeries, consent was obtained for 102 patients and 86 patients were included in the study. We found a statistical significant negative correlation between the level of pain (at rest, dynamic and worst pain experienced in between) at 24 and 48 hours postoperatively and patient satisfaction with pain management (rho=-0,33 to -0.41, $p<0,01$).
Interestingly, there was no significant correlation between de level of pain at 4 hours and satisfaction with pain management (r=-0,6 to -1,6, p=0,15 to 0,59), despite the higher levels of pain at that time.
**Conclusion(s):** The pain experienced at 24 and 48 hours postoperatively correlated with patient satisfaction with pain management. Early postoperative pain (at 4 hours postoperatively) did not influence patient satisfaction, although patients experienced higher levels of pain in this period of time. Is yet to be determined if this results are due to patients' expectations in the early postoperative period.
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## 09AP04-8

### Comparison of effects of intravenous and epidural analgesia on postoperative bowel movements in patients undergoing laparoscopic gastrectomy: a prospective and randomized study

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**Background and Goal of Study:** Sympathetic hyperactivation is one of the causes of postoperative ileus, which occurs frequently after abdominal surgery and adversely influences the patient's prognosis. We aimed to investigate whether sympatholytic effect of epidural analgesia could attenuate postoperative ileus in patients undergoing laparoscopic gastrectomy.
**Materials and methods:** Thirty-nine patients were randomized to receive general anesthesia combined with either epidural analgesia (n = 19) or intravenous analgesia (n = 20). The primary goal was to compare postoperative bowel movements by evaluating the time to first flatus. The balance of the autonomic nervous system, duration of postoperative hospital stay, and pain scores were assessed.
**Results and discussion:** The time to first flatus was significantly shorter in the Epidural group than in the Intravenous group (63.9 ± 9.1 h vs. 81.2 ± 19.2 h, $P = 0.006$). During pneumoperitoneum, the low-frequency/high-frequency powers ratio was maintained in the Epidural group compared with the baseline value, whereas it was increased in the Intravenous group ($P < 0.05$). The length of postoperative hospital stay was 5.6 ± 0.5 days in the Epidural group and 6.2 ± 1.9 days in the Intravenous group ($P = 0.076$). Patients in the Epidural group had lower pain scores and required fewer additional analgesics at 1 h postoperatively.
**Conclusion(s):** Epidural analgesia facilitated bowel movements and reduced early postoperative pain in patients undergoing laparoscopic gastrectomy. This may be attributed that epidural analgesia provided better sympatholytic and analgesic effects compared to intravenous analgesia.

## 09AP04-9

### Dexamethasone as an adjuvant to bupivacaine in the ultrasound oblique subcostal transversus abdominis plane (OSTAP) block to improve quality of recovery after ambulatory laparoscopic cholecystectomy

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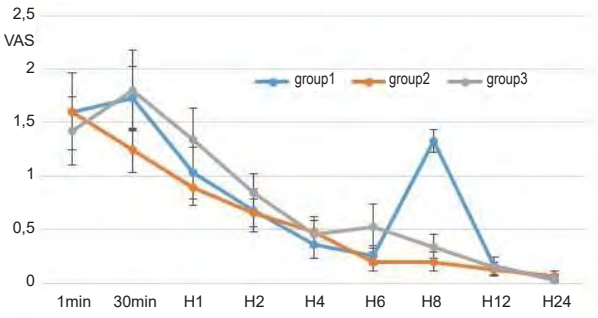
**Background and Goal of Study:** The effectiveness of intravenous dexamethasone (DEXA) in prolonging the duration of analgesia seems similar to perineural DEXA [1]. However, it is unknown whether DEXA with local anesthetic (LA) in the OSTAP block provides a better postoperative quality of recovery (QOR) to patients undergoing ambulatory surgery. We aimed to evaluate the effect of DEXA in combination with LA in OSTAP block on QOR after laparoscopic cholecystectomy compared to intravenously DEXA associated with OSTAP block.
**Materials and methods:** After approval from the local ethics committee and with written informed consent, 90 consecutive patients ASA I/II adults (> 18 years old) scheduled for laparoscopic cholecystectomy were included in this prospective randomized double-blinded study. The non-inclusion criteria was the allergy to LA and Body Mass Index >30. Patients were randomly allocated into 3 groups:
Group 1 = received 30 ml 0.125% bupivacaine in an Ultrasound-Guided bilateral OSTAP,
Group 2 = received the same block with the same concentration of LA + 8mg (4ml) DEXA intravenously,
Group 3 = received DEXA added to LA in each side.
Primary outcome was quality of recovery score (QOR-09) at 24 hours after surgery. Secondary outcomes were the VAS score (while moving and at rest), the first lift, the morphine consumption, nausea and vomiting. Statistical analysis were performed using IBM SPSS 20. Continuous variables were compared using One-way ANOVA and post-hoc Tukey test. Categorical variables were compared using the chi-square test. A p values less than 0.05 were considered significant.
**Results and discussion:** Eighty-five patients completed the study protocol (group1, n=30, group2, n=29, Group3, n=26).The median Q0R-09 score was significantly lower in group1 1.55 [1.3-1.8] than group2 1.69 [1.3-1.8] and group3 1.72 [1.3-1.8] with $p<10^{-3}$ (Table 1).

| | group1 (1) | group2 (2) | group3 (3) | p |
|---|---|---|---|---|
| Morphine Consumption (mg) | 3.2±0.4 | 1.3±0.4 | 1.57±0.5 | (1)vs(2)0.07<br>(1)vs(3)0.05<br>(2)vs(3)0.7 |
| First Lift (H) | 5±0.4 | 5.5±0.4 | 6.4±0.7 | NS |
| Nausea-Vomiting (%) | 26.7 | 6.9 | 3.8 | (1)vs(2)0.08<br>(1)vs(3)0.03<br>(2)vs(3)NS |

*[Secondary outcomes, comparison between groups]*

Only VAS pain score at 8h postoperatively was significantly higher in group1 (Graph 1).




*[Postoperative VAS pain scores at rest]*

**Conclusion(s):** Dexamethasone as an adjuvant to bupivacaine in OSTAP block was effective in reducing postoperative pain score intensity, opioid requirement and in improving quality of recovery after laparoscopic cholecystectomy as well as a single dose of dexamethasone (8 mg) intravenously associated with OSTAP block.
**References:**
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## 09AP04-10

### Effectiveness of continuous femoral block nerve after total knee arthroplasty as postoperative analgesia through an acute pain management program

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**Background and Goal of Study:** Total knee arthroplasty (TKA) causes a severe postoperative pain. Continuous femoral block nerve (CFBN) allows adequate pain control with fewer complications.
Our goal is evaluate the analgesic quality of CFBN and the occurrence of complications in patients with TKA through our Acute Pain Management Program (APMP)
**Materials and methods:** Descriptive retrospective study including 418 patients scheduled to TKA using continuous femoral blockade for postoperative analgesia between 2014 and 2015.
Patients received analgesia by elastomeric pump with 0,125% levobupivacaine (infusion rate 7-12 mL/h, 5 mL boluses and closing time of 30 min). Complementary analgesia was given by paracetamol and dexketoprofen and rescue analgesics with tramadol.
Demographic characteristics, VAS (mm) at rest and in motion, boluses given, modifications of the infusion rate and complications presented were recorded.
**Results and discussion:** 418 patients were registered. Median age 69,6 (SD 8,3). Median BMI 31,1 (SD 5,1). ASA I/II/III (%): 3,1/72,2/24,7. Women/Men(%): 70,5%/29,5. Most patients showed mild pain (VAS <30mm) measured at 24 and 48h by the team of the APMP (Table 1). Less than 5 boluses at 24 and 48h were needed, respectively, by 59,4% and 79,6% of patients.
The most common complication (11,2%) was sickness or vomiting, due probably to rescue opioids. A significant percentage of patients (8,7%) had an accidental release of the catheter. The rest of complications are showed on Table 2.
Basal infusion rate was modified in 30 patients (7,3%) in order to improve pain control after medical exam at 24h. Only 1,9 % of patients did not understand the PCA system operation.
**Conclusion(s):** Postoperative analgesia through CFBN is effective and safe after TKA. The AMPM allows to detect early complications and optimize the analgesia provided to our patients after surgery. A close cooperation between the anesthesiologist, nurses and surgeons is essential for the management of these patients.
**References:**
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## 09AP04-12

### Post-operative analgesia for oesophagectomy - thoracic epidural or paravertebral blockade?

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**Background and Goal of Study:** Surgery remains the mainstay of curative treatment in oesophageal cancer,for which there are a variety of surgical approaches.Surgical access may be gained by a single thoracoabdominal(TA) incision or but separate thoracic and abdominal incisions (e.g. Ivor-Lewis Oesophagectomy (ILO)).Thoracic epidural (TE) has been used for post-operative analgesia however their placement can be time consuming,potentially uncomfortable for the patient and may cause significant adverse effects. Alternatively paravertebral blockade (PVB) through infusion catheters inserted under direct vision during surgery may be used.Recent data suggest this provides comparable analgesia,with a lower side-effect rate in major thoracic surgery.We retrospectively audited the efficacy of PVB and TE for oesophagectomy.
**Materials and methods:** The notes of 151 consecutive patients undergoing oesophagectomy from July 2012 and August 2014 were reviewed, and the patient demographics and modality of analgesia (and any subsequent

change) were noted. Pain scores in recovery and for 3 days post-op were also recorded. Pain scores were recorded on a scale of 0-3, where severe pain scored 3, whilst no pain was 0. 6 cases contained insufficient data for analysis.
**Results and discussion:** 59 (38.2%) cases underwent ILO & 73 (42.9%) underwent TA oesophagectomy.The remainder received McKeown's oesophagectomy (18 cases (8.8%)) or Lap-assisted ILO (17 cases (10%)).Of those undergoing ILO, 43 (66%) received TE for post-op analgesia, 12 (18.5%) received PVB.The remainder received other combinations of analgesia.
There was no significant difference in levels of analgesia (Fisher's exact test p>0.95 on all days). Both groups reported adequate analgesia on days 1-3 (>85% reporting no/mild discomfort.In those receiving TA oesophagectomy,59(80.8%) had TE and 11(15.1%) had PVB.In 3 (4.1%) other analgesia was used. In recovery,11 patients receiving TE (19.0%) reported inadequate analgesia, compared with 5 patients receiving PVB (45.5%);a greater proportion of patients receiving PVB after TA oesophagectomy reported inadequate analgesia on days 1 & 2 post-op.
**Conclusion(s):** Many studies suggest that TE provides good analgesia postoperatively, however it is not without risk.
Our data noted that PVB may be sufficient for analgesia following ILO, it is less effective in TA oesophagectomy. These data may be applied to improve patient management particularly as part of an enhanced recovery program.

## 09AP05-2

### Epidural analgesia after vascular surgery: intermittent bolus or continuous perfusion? - a database analysis of prospectively raised data

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**Background and Goal of Study:** Pain is still frequent in postoperative period. The best analgesia technique for postoperative pain (POP) is still under debate. The aim of our study was to compare continuous (CEP) with intermittent epidural (IEP) analgesia 24h after vascular surgery.
**Materials and methods:** Database analysis of patients submitted to EP analgesia after vascular surgery from January 2011 to September 2015 at a tertiary university hospital. Patients' demographics and perioperative data were collected. Descriptive analysis was performed and the Mann-Whitney, Fischer's exact or Chi-square tests were used.
**Results and discussion:** We included 398 patients, 77.4% received IEP and 22.6% CEP. Patients submitted to CEP were younger (63.5 [57-72] vs 67 [60-77] years, p=0.006) and had chronic kidney failure [S1] more frequently (14.4% vs 7.5%, p=0.042). There was no difference between the groups regarding ASA physical status, type of surgery or other comorbidities. Analgesia level (98% lumbar-LEP and 2% thoracic-TEP) was adequate for surgery. Patients with TEP received more frequently CEP (87.5% vs 21.0%, p<0.001). CEP receive on average 7 [7-9] ml of local anaesthetics per hour while IEP received 6 [5-7] ml every 4-8h (p<0.001). The worst dynamic pain experienced during the first 24h after surgery, measured by Numeric Rating Scale for pain evaluation (NRS), was lower in the CEP group (4 [2-5] compared to 5 [3-6] in the IEP group, p=0.001). [S2] [PR3] NRS in the first postoperative consultation was 0 [0-2] for IEP compared to 0 [0-1] for CEP[S4] (p=0.011) at rest and 3 [1-4] IEP compared to 2 [1-4] for CEP (p=0.001) for dynamic pain. There was no difference regarding side effects (paraesthesia, nausea, hypotension or motor block). On a scale from 1-5, 83.7% of patients declared themselves "satisfied" (4) or "very satisfied" (5) with pain control and hospital stay but CEP group was more frequently very satisfied (40.5% vs 22.4%, p=0.005) 24h after surgery.
**Conclusions:** CEP is not a usual technique for POP management in this hospital. Patients submitted to CEP had less dynamic and at rest pain and were more satisfied 24h after vascular surgery but they received a superior amount of local anaesthetics.

## 09AP05-3

### Effectiveness and safety of epidural analgesia for postoperative pain management after vascular surgery: a database analysis of prospectively raised data

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**Background and Goal of Study:** Approximately 30-80% of patients still complain about moderate to severe postoperative pain (POP), indicating that treatment is still a problem. The aim of our study was to evaluate effectiveness and safety of epidural (EP) analgesia for postoperative pain management after vascular surgery.
**Materials and methods:** Database analysis of patients submitted to EP analgesia after vascular surgery from January 2011 to September 2015 at a tertiary university hospital. Patients' demographics and perioperative data were collected. Descriptive analysis was performed and the Mann-Whitney, Wilcoxon signed-rank, Fischer's exact or Chi-square tests were used. Data is presented as median and interquartile range [P25-P75].
**Results and discussion:** We included 417 patients evaluated in postoperative period by acute pain unit. Age 66 [60-76] years, ASA physical status I/II (34%) and III/IV (66%), frequent comorbidities: 66.2% arterial hypertension, 37.2% diabetes mellitus, 34.8% tobacco consumption, 16.3% dyslipidaemia, 10.8% coronary disease, 9.6% chronic kidney disease, 8.6% chronic pulmonary disease, 7.9% cerebrovascular disease, 4.8% auricular fibrillation, 2.9% congestive heart failure. Type of surgery included lower limb arterial bypass (85.9%) and EVAR (11%). Most (89.3%) received subarachnoid and EP anaesthesia while 10.7% received only EP. Neuroaxial level and solution volume (7 [5-9] ml) were adequate for surgery and postoperative pain management (98% lumbar and 2% thoracic).
During the first 24h after surgery (D1), 77.4% received local anaesthetics bolus and 22.6% continuous perfusion. Average Numeric Rating Scale for pain evaluation (NRS) at D1 was 2 [0-4] at rest and 5 [3-6] on movement. Uncontrolled pain defined by NRS>3 occurred in 16.1% of patients at D1. The NRS improved in all patients during the following 24h (p<0.001 for both NRS) and incidence of uncontrolled pain was lower (12.5%).
Problems with catheter included accidental removal (4.1%) and misplacement (1.6%). Side effects included paraesthesia (6.2%), nausea (3.1%), hypotension (2.6%) and motor block (2.4%). On a scale form 1-5, 84.1% of patients declared themselves satisfied (4) or very satisfied (5) with their hospital stay until 48h after surgery.
**Conclusion(s):** EP bolus was the most frequent analgesia technique. EP analgesia after vascular surgery was safe and effective and most patients were satisfied during their hospital stay.

## 09AP05-5

### The effect of gabapentin premedication on postoperative pain management after abdominal hysterectomy

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**Background and Goal of Study:** This prospective randomized double-blind placebo-control study was designed to investigate if oral premedication with gabapentin could improve the postoperative pain control after abdominal hysterectomy via Pfannenstiel incision.
**Materials and methods:** After Ethics Committee approval and written consent, 64 ASA I-III women, scheduled for abdominal hysterectomy under general anaesthesia were recruited.They were randomly allocated into two groups: group G (n=30) receiving 1200mg oral gabapentin one hour before surgery and group P (n=34) treated with placebo. Postoperative analgesia was achieved by morphine PCA (1mg bolus dose, 5 min lockout interval and 8 mg limit in 1h) and iv paracetamol (1g/6h). During first 48h postoperatively pain at rest and while coughing, evaluated by VAS at 1, 2, 4, 8, 24, 48h postprocedure, total morphine consumption and duration of pain-free interval were recorded. The incidence of sedation, nausea/vomiting and patient satisfaction with analgesia regimen were registered, too. Statistics used Student t-test and Mann-Whitney test with significance above 0.05.
**Results and discussion:** Demographics was similar in both groups. Pain intensity at rest, as well as length of pain-free interval did not differ between the two groups. At cough, VAS registered significantly lower values in group G at each postoperative time (p<0.05). Cumulative morphine consumption until 48h postoperatively was significantly less in group G compared to group P

(p<0.001). Lower incidences of sedation and nausea/vomiting were noted in group G (p<0.05). Patient satisfaction recorded a considerably increased rate for group G versus group P (p<0.05).
**Conclusion(s):** Gabapentin premedication decreases considerably morphine consumption by PCA and the incidence of correspondent side effects, thus improving quality of analgesia during first 48h after abdominal hysterectomy.

## 09AP05-6

### Using perioperative multimodal analgesia results in decrease acute but not chronic postoperative pain in patients with lumbar herniated disc

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**Background and Goal of Study:** Using perioperative multimodal analgesia has a potency for prevention chronic postoperative (PO) pain. Failed back surgery syndrome (FBSS) is the debilitating chronic pain condition. Is it possible to decrease the rate of FBSS by improving the perioperative analgesia in patients with lumbar herniated disc?
**Materials and methods:** 129 patients (18-70 years, 2-3 ASA) scheduled for elective lumbar discectomy in 2010-2013 were enrolled in prospective observational study. GA+OD (n=20) underwent general anaesthesia (GA) and PO analgesia on-demand. SB+PMA (n=23) got subarachnoid block (SB) and preventive multimodal analgesia (PMA) including ketoprofen, paracetamol and nalbuphine on-demand. At GA+PMA (n=21) GA and PMA were used; GA+PMA+I (n=21) also had bupivacaine wound infiltration; at GA+PMA+S (n=20) - depo-corticosteroid was applied on affected spinal nerve root; at GA+PMA+IS (n=24) wound infiltration and local corticosteroids were combined. 7 days PO the dinamic VAS pain scores were recorded. In 6 months the phone survey was performed and follow-up (NRS pain scores, quality of life (QOL), disability, sleep disorder) was assessed.
**Results:** GA+OD had not adequate pain relief during 4 PO days but GA+PMA had. The VAS scores in SB+PMA were less than in GA+PMA only in 2 hours PO (1 (0-3,5) and 4 (2,5-6), p=0,002, Mann-Whitney test).

| Group | 2nd POD, VAS | 4th POD, VAS | 6 months, NRS |
|---|---|---|---|
| GA+OD | 5 (4-7) | 5 (2,5-6) | 3 (2-5) |
| GA+PMA | 3 (1,25-4,5)* | 2 (0,5-4)* | 2 (1-3) |
| SB+PMA | 3 (2-4,5) | 2,25 (1-5) | 3 (2-5) |
| GA+PMA+I | 1,5 (1-3)† | 1 (0,5-2) | 3 (3-3) |
| GA+PMA+S | 2,5 (1-4) | 2 (1-2,75) | 3 (2-3) |
| GA+PMA+IS | 1,75 (0,75-3,25)† | 1 (0,25-3,5) | 3 (1,5-3,75) |
| POD-postoperative day | | | |

*-p<0.05, comparison with GA+OD, Mann-Whitney test
†-p<0.05, comparison with GA+PMA, Mann-Whitney test

*[Postoperative pain scores, Me (LQ-UQ)]*

In 6 months 60% patients experienced back or leg pain and 30% - leg pain. Some patients suffered from FBSS with sleep disorder (24%), disability (25%), decrease QOL (23%). There was not significant difference between groups in term of neither rate of chronic pain in common and leg pain specifically (p=0,459 and p=0,903 respectively, $\chi^2$-test) nor NRS pain scores (p=0,112, Kruskal-Wallis ANOVA).
**Conclusions:** PMA is the better choice than analgesia on-demand. Additional bupivacaine wound infiltration follows significant pain relief during 2 PO days. The rate of FBSS doesn't depend on the mode of perioperative analgesia.

## 09AP05-7

### Non-pharmacologic methods for post-operative pain relief - an alternative to drugs or just a figment of imagination?

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**Background and Goal of Study:** Non-pharmacological treatments (NPTs) like, e.g., cold packs, acupuncture, meditation, or distractions, are widely used to ease post-surgical pain. We show how frequently they are used across Europe and if there is an association between its use and patient-reported outcomes of pain relief and reduced wish for more pain treatment.
**Materials and methods:** We use data from the world's largest acute pain registry PAIN OUT where patients report their pain levels and side effects after surgery. 15 different NPTs are tested for their effectiveness using Mann-Whitney-U-test, Kruskal-Wallis-test, General Linear Model, and Logistic Regression. We adjust for age and gender and further specifically look at the three most frequent surgeries in PAIN OUT: total knee replacement, total hip replacement, and laparoscopic cholecystectomy.
**Results and discussion:** 14,767 patients from 12 European countries were analyzed. The 8,204 (55.6%) patients who did not use NPTs had slightly but significantly more pain relief than the 6,563 (44.4%) patients who did use them (means of 71.2%±27.9% vs. 68.6%±25.7%, p=.000). Using NPTs does not affect the wish for more pain treatment. No single NPT stood out from these results. Only for total knee arthroplasty, a positive effect of NPTs on pain relief could be found.
**Conclusion(s):** Some NPTs are widely used while some are not. Their effectiveness concerning pain, based on this observational data, could not be shown. The literature on the topic is contradictory and our findings add to this. Benefit and costs of NPTs should thus be considered carefully.

## 09AP05-8

### Usefulness of preoperative thoracic paravertebral block in postoperative pain management after renal resection surgery

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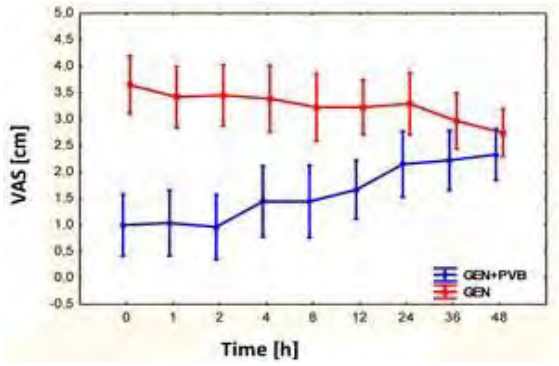
**Background and goal:** Thoracic paravertebral block (ThPVB) combined with general anesthesia is commonly used in thoracic surgery. It provides effective analgesia, reduces surgical stress response and incidence of chronic postoperative pain compared to solely used general anaesthesia. The goal of the study was to assess the usefulness of ThPVB in postoperative pain management after renal resection surgery.
**Material and methods:** Patients ASA I-III scheduled for elective renal resection surgery were randomly assigned to two groups (n=58). PVB group (n=27) received preoperative ThPVB with 0,5% bupivacaine followed by general anaesthesia. GEN group (n=31) received standard general anaesthesia. Both groups were treated postoperatively with oxycodone IV PCA (patient controlled analgesia) combined with non-opioid analgesics as rescue drugs. We recorded pain severity in VAS, oxycodone requirement in time points, total oxycodone requirement, and sedation level through the first 48h. We measured opioid related adverse events 24 and 48h postoperatively and patients satisfaction 48h postoperatively.




*[Pain intensity in VAS scale ]*

Data were analysed by using unpaired Student's t-test, Mann-Whitney U-test and $\chi 2$ test. Analysis of the changes over time was performed using parametrical variance analysis. Results are presented as mean ± sd, median or percentage. $P < 0.05$ was considered statistically significant.
**Results:** Patients given ThPVB needed 39% less IV oxycodone in the first 48 h, had a longer latency to the first opioid dose, and less pain at rest in VAS scale through first 24 h than the control($p < 0.01$). They had less opioid related adverse events after 24 and 48 h and were less sedated until 12 h postoperatively. Patients in PVB group also had higher satisfaction scores after 48 h postoperatively compared to control group.
**Conclusions:** In our study preoperative ThPVB was an effective part of multimodal analgesia regimen in reducing opioid consumption and pain intensity. Methods and drugs used in both groups can be considered safe with no serious AE recorded. Majority of non-serious AE was opioid related adverse events.Patients in ThPVB group reported increased satisfaction compared to the control group.

## 09AP05-9

### Treatment of low back and leg pain with epidural catheter insertion in pregnant woman

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**Background:** 45% of pregnant women experienced low back pain. Among them, 25% persons have severe pain. Treatment suggested TENS, acupuncture, physical therapy et al. This case presented that 32 weeks pregnant woman patient had severe acute low back and leg pain which was treated with epidural catheter and intermittent local analgesics injection.
**Case report:** The 32 weeks gestational pregnant woman visited emergency room and complained low back and right leg pain. The pain which was from right gluteal region to leg with numb, evoked 3 days ago and visual analogue scale (0= no pain, 10= very severe pain). At emergency room, the position of patient was stand and leaned to desk or bed with flexion back near right angle which made pain less severe but VAS 8-9. The patient did not keep supine position or decubitus for several minutes which caused pain and numb. Although pethidine 25mg was injected intramuscular to reduce pain, Magnetic resolution images (MRI) could not be taken because the patient could not keep supine position. Therefore lumbar 4/5 and 5/S1 disc protrusion was confirmed by computed tomography. Consultation was taken and we inserted epidural catheter. The catheter position was checked with fluoroscopy because we worried about intravenous injection of local anesthetics. The catheter was confirmed epidural space about L3/4 and 0.15% ropivaciane 6 ml was injected. The pain reduced to VAS 4-5 after several minutes later and the patient could lie on the bed. Fetal heart rates was normal after injection. Twice injection of 0.15% ropivacaine 6 ml reduced pain VAS 2-3 and the patient discharged 5 day later. Any complications were not observed.
**Discussion:** Local anesthetics injection though epidural catheter attenuates pain evoked by inflammatory substances of disc protrusion. We could pain control by epidural catheter insertion without any side effects of both mother and baby.
**References:**
1. P Kristiansson, K Svärdsudd, B von Schoultz. Back pain during pregnancy: a prospective study spine. 1996; 21: 702-8.
2. Pishnamaz M, Sellei R, Pfeifer R, Lichte P, Pape HC, Kobbe P. Low back pain during pregnancy caused by a sacral stress fracture: a case report. J Med Case Rep. 2012 4;6:98.
**Learning points:** Epidural catheter insertion and intermittent local anesthetic injection was effective methods for treatment of low back and leg pan in pregnant woman without side effects.

## 09AP05-11

### The impact of patient education about postoperative pain

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**Background and Goal of Study:** Moderate to severe postoperative pain remains a clinical problem but most patients report being satisfied with their postoperative pain management.[1,2] There are contradictory findings about the influence of preoperative patient education about pain in patient satisfaction and anxiety.[3]
Our study aimed to determine if patients scheduled to elective surgery at a university hospital were informed about the importance of pain management, and the impact of this information on patient's experienced pain and satisfaction.
**Materials and methods:** In this prospective observational study we administered a questionnaire to all patients undergoing elective inpatient surgery on 3 random non-consecutive days, after ethical committee's approval.
We ascertained if doctors or nurses informed their patients about the importance of pain and its treatment, and that they should report any experienced pain. We evaluated patient satisfaction with their pain management (using a Likert scale), and if they requested more or different analgesia. The pain at rest and dynamic pain were assessed at 4, 24 and 48 hours postoperatively, as well as the worst pain experienced in between, using a numeric scale from 0 to 10. The Mann-Whitney U and Chi-square tests were used to compare the variables (statistical significance $p<0,05$).
**Results and discussion:** There were 115 scheduled surgeries, consent was obtained for 102 patients and 86 patients were included in the study.
Two thirds were informed about the importance of their pain management and that they should report any experienced pain; 1/3 did not receive that information.
The informed group experienced a statistical significant higher level of satisfaction ($U=582$, $p=0,014$). There were no statistical significant differences between the level of pain experienced by the 2 groups over the 48-hour period ($U=637$ to 824, $p=0,08$ to 0,98), nor in the request of additional or different analgesia ($X^2=0,953$, $p=0,33$).
**Conclusion(s):** The information about the importance of pain given to patients contributed to their satisfaction with pain management.
The informed patients did not experience higher levels of pain, nor did they request more analgesia or different analgesics.
**References:**
1. Svensson I, Sjöström B, Haljamäe H. Eur. J. Pain 2001; 5:125-133
2. Niemi-Murola L, Pöyhiä R, Onkinen K, et al. Pain. Manag. Nurs. 2007; 8(3):122-129
3. Sjöling M, Nordahl G, Olofsson N, e tal. Patient. Educ. Couns. 2002; 51:169-176

## 09AP05-12

### Effects of epidural analgesia with low concentrations of local anesthetics on the course of labor and delivery

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**Background and Goal of Study:** Epidural analgesia is an extremely effective and popular treatment for labor pain. The aim of the present study was to evaluate the impact of using of low concentrations of local anesthetics, combined with lipid-soluble opioids, on the progress of labor.
**Materials and methods:** In this retrospective study, we enrolled 99 first labor patients, 55 of which received epidural analgesia technique with top-up, with L-bupivacaine 0.0625% and sufentanil, and 54 formed the control group. We compared two groups of patients by recording the time of the dilatation/expulsion/delivery times, the use of oxytocin (augmentation), the incidence of cesarean section and the incidence of operative delivery. We also evaluated the neonatal outcome in terms of Apgar score at 1st and 5th minute, and measuring the base excess of venous and arterial cord blood.
We used t test for continuous variables or chi square analysis for categorical variables. A p lower of 0.05 was considered significant.
**Results and discussion:** We did not detect a significant difference in the duration of the expulsion stage of birth ($p = 0.19$). The use of oxytocin was significantly higher in the study group ($p < 0.001$), while the use of cesarean section was significantly more frequent in the control group ($p = 0.04$). We did not observe differences in the use of operative delivery ($p = 0.52$). For the neonatal outcome, we did not record significant differences between the two groups in terms of Apgar at the1st minute ($p = 0.64$) and the 5th minute ($p = 0.44$), nor in terms of acidosis in arterial and venous cord blood (respectively, $p = 0.30$ and $p = 0.65$).
**Conclusion:** In the cases analyzed, the use of epidural analgesia with use of low concentration solution of local anesthetic and opioid was not associated with prolongation of the expulsion stage of birth, with a higher incidence of cesarean section and operative delivery, nor with a difference in terms of neonatal Apgar score.

## 09AP06-1

### The effects of chlorzoxazone on acute pain and opioid requirements after spine surgery. A randomized, blinded trial

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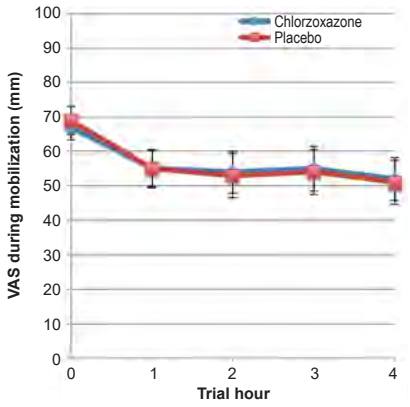
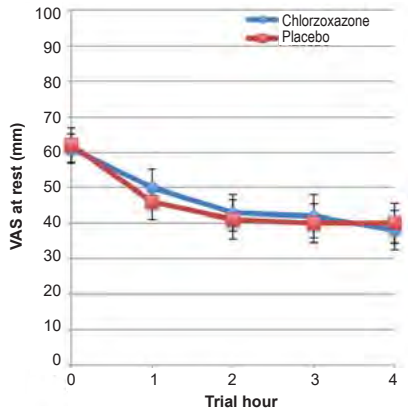
**Background and Goal of Study:** Chlorzoxazone is a muscle relaxant used in the management of musculoskeletal pain, and as an analgesic adjunct for postoperative pain. Chlorzoxazone for low back pain is currently not recommended due to the lack of placebo controlled trials. We aimed to explore the analgesic and adverse effects of chlorzoxazone on acute pain after spine surgery.
**Materials and methods:** 110 patients were randomly assigned to 500 mg oral chlorzoxazone or placebo in this blinded study of patients undergoing spine surgery in general anaesthesia. In the 4 hour trial period analgesia consisted of IV patient-controlled analgesia (morphine bolus 2.5 mg). Primary outcome was pain during mobilization (visual analogue scale) 2 hours after intervention. Secondary outcomes were pain at rest, opioid consumption, nausea, vomiting, ondansetron use, sedation, and dizziness. Pain data were analysed with the independent samples t-test. Other data were analysed with the Mann-Whitney *U*-test and $\chi 2$ test for categorical data.
**Results and discussion:** For pain during mobilization 2 h after intervention, there was no significant difference between groups: 51 (21) *vs.* 54 (25) mm in the chlorzoxazone and placebo groups, respectively, mean difference of 3 mm (95% CI -8 to 10), P = 0.59 (Fig. 1). For pain during mobilization and at rest (weighted AUC 1 - 4 hours) there was no significant difference between groups (Fig. 1 and 2). There was no significant difference in total IV morphine consumption 0-4 h: Median 10 (0 - 70) *vs.* 13 (0 - 38) mg in the chlorzoxazone and placebo groups, respectively, P = 0.82. There was no significant difference in adverse effects 0-4 h.




*[Figure 1. Pain (VAS) during mobilization]*




*[Figure 2. Pain (VAS) at rest]*

**Conclusion(s):** We found no analgesic effect of chlorzoxazone in patients with acute postoperative pain after spine surgery. Based on this, chlorzoxazone cannot be recommended for acute pain treatment after spine surgery.

## 09AP06-2

### Minimizing use of opioids in patients with morbid obesity

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**Background and Goal of Study:** Opioids are well known to have exaggerated responses in patients with morbid obesity and obstructive sleep apnea thus minimizing its use is beneficial. In this study we investigated the influence of intraoperative opioid sparing analgesia on postoperative opioids requirement.
**Materials and methods:** 40 patients with BMI>40 scheduled for laparoscopic vertical sleeve gastrectomy or laparoscopic gastric bypass procedures were enrolled. Patients were prospectively randomized into two groups. In group 1 (n=20) opioid sparing analgesia was used. It included 4 drugs: clonidine, ketamine, lidocaine, Mg sulfate.

| | Loading dose | Maintenance dose |
|---|---|---|
| Clonidine | 1 μg/kg | 1 μg/kg/h |
| Ketamine | 0.2 mg/kg | 0.2 mg/kg/h |
| Lidocaine | 1.5 mg/kg | 1.5 mg/kg/h |
| Magnesium sulfate | 40 mg/kg | 10 mg/kg/h |

*[Opioid sparing analgesia]*

Loading dose was delivered in form of infusion for 20 min and followed by titration of maintenance dose. All doses were calculated based on lean body weight. Opioid sparing analgesia was stopped immediately after extubation. In group 2 (n=20) fentanyl (1.5-2 μg/kg/h) was given for intraoperative analgesia.
In both groups patients received gabapentin 600 mg prior to surgery. Anesthesia was induced with fentanyl and propofol. Rocuronium was given for muscle relaxation and was guided by neuromuscular monitoring. Neuromuscular block was reversed by sugammadex. Wound infiltration with local anesthetic was performed in all patients. Post-op analgesia consisted of paracetamol 1000 mg x 4, lornoxicam 8 mg and gabapentin 600 mg twice a day. Morphine was given i.v. on demand (VAS score ≥4). Primary end-point was number of patients who needed morphine bolus.
**Results and discussion:** In group 1 patients had lower maximum VAS score. In opioid sparing group only 11 patients needed bolus of morphine compared to 16 patients in group 2. Total dose of morphine was higher in patients who received standard intraoperative analgesia with fentanyl.

| | Group 1 (opioid sparing analgesia) | Group 2 (standard analgesia) |
|---|---|---|
| Maximum VAS score during first 4 hours | 4 (2-6) | 5 (2-7) |
| Number of patients who needed morphine | 11 | 16 |
| Time to first dose of morphine, min | 110 (50-190) | 70 (30-140) |
| Total dose of morphine, mg | 8 (6-12) | 11 (6-16) |

*[Postoperative analgesia]*

**Conclusion(s):** Opioid sparing analgesia providing sympatholytic effects during anesthesia had a positive influence on postoperative pain management in patients with morbid obesity.

## 09AP06-3

### Effects of dexmedetomidine alone for intravenous patient - controlled analgesia after laparoscopy-assisted colorectal surgery

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**Background and Goal of Study:** Laparoscopic techniques have been widely used for the surgical management of colorectal cancer. But pain after laparoscopic colectomy is still observed. Dexmedetomidine has analgesic actions but does not cause respiratory depression [1]. Pain management in previous studies for dexmedetomidine was combined with opioids. Previous studies suggest conflicting results regarding its analgesic effects [2, 3]. However, there was no study conducted that the administration of dexmedetomidine alone for PCA. Our study aims to test the hypothesis that administration of dexmedetomidine alone for PCA after laparoscopic colorectal surgery can decrease pain intensity and side effects.
**Materials and methods:** The study protocol was approved by the Institutional Review Board (IRB) of Shandong Cancer Hospital and Institute. 30 patients who underwent laparoscopic colorectal surgery were recruited into the study and randomly divided into dexmedetomidine (D) or fentanyl (F) group. Informed consent was obtained from all patients. A standardized anesthesia technique was used in two groups. After surgery PCA pump (with a background infusion) was attached to the IV. PCA protocol consisted of 0.02 mg/kg fentanyl (F group), 0.25μg/kg/h dexmedetomidine (D group), and ondansetron 4mg diluted into 100 ml respectively. The visual analog scale scores (VAS) at 4, 6 and 24h and Ramsay sedation score were recorded by a blinded research staff. Patients' satisfactions to pain management, the incidence of post-operative nausea and vomiting (PONV), first time to passage of flatus and bowl movement was also observed. Statistical analyses were performed using SPSS for Windows 11.5 (SPSS Inc., Chicago, IL). P-values <0.05 were considered statistically significant.
**Results and discussion:** The baseline characteristics were no significant difference between two groups. The VAS scores and the sedation level were no significantly difference between two groups. The incidence of PONV was no significantly difference between two groups. Patients' satisfactions in group D were significantly higher than those in group F. The median time to passage of flatus and bowl movement was decreased in group D compared with group F. of gastrointestinal function.
**Conclusion(s):** Dexmedetomidine alone is effective for patient-controlled analgesia with faster recovery of gastrointestinal function for patients after laparoscopic colorectal surgery.

## 09AP06-4

### The safety profile of parecoxib for the treatment of post-operative pain: an examination of over 10 years of post-authorization safety data

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**Objective:** Parecoxib, an injectable COX-2-selective inhibitor, is approved in over 80 countries for the short-term management of post-operative pain and, in some countries, for the treatment of acute pain or renal colic. Parecoxib first received regulatory approval in 2001 and there is a wealth of post-authorization data available regarding its use in real-world settings. The current study reviews this data to examine the occurrence of pre-defined safety events associated with COX-2 inhibitors and/or traditional NSAIDs.
**Methods:** Data were derived from a Pfizer database which captures and stores reported adverse event (AEs) information from across the globe. AEs were coded to a specific Medical Dictionary for Regulatory Activities (MedDRA) term upon entry into the database. The database was searched for specific MedDRA terms or standard queries corresponding to the pre-defined safety events. The number of medically-confirmed cases, along with outcome, through March 31st 2014 was presented for each event.
**Results:** The occurrence of pre-defined safety events was relatively low considering that 69,567,300 units of parecoxib were sold from the first quarter of 2002 through the first quarter of 2014. The total number of reports/number of reports classified as serious for each event over this period was as follows: cardiovascular embolic and thrombotic events (66/64), renal failure and impairment (77/68), gastrointestinal ulceration-related events (35/35), hypersensitivity reactions (190/98) including severe hypotension (32/25) and severe cutaneous adverse events (17/17), and masking signs of inflammation (18/18). Among reports with known outcomes, a majority of patients recovered or were recovering from these events. A total of 46 fatalities, which cannot be confirmed as treatment-related, were reported as outcomes: cardiovascular embolic and thrombotic events (20), renal failure and impairment (6), gastrointestinal ulceration-related events (4), hypersensitivity reactions (7) including severe hypotension (3) and severe cutaneous adverse events (2), and masking signs of inflammation (4).
**Conclusion:** The occurrence of pre-defined safety events was relatively low with parecoxib considering nearly 70 million units were sold over a 12 year evaluation period, which is consistent with data from the clinical trial program. When administered according to the approved label, the overall benefit/risk assessment is considered favorable for parecoxib. Sponsored by Pfizer.

## 09AP06-5

### Thoracic paravertebral block for video-thoracoscopic surgery: adding sufentanil to ropivacaine does not improve analgesia when compared to plain ropivacaine

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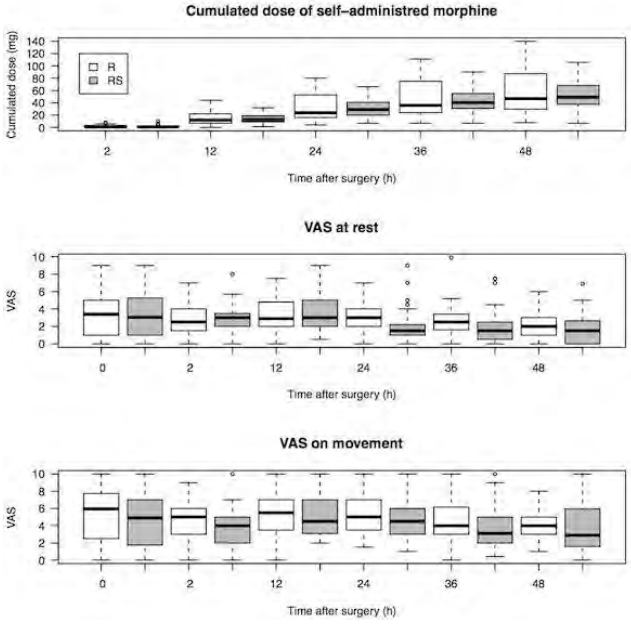
**Background and Goal of Study:** Video-thoracoscopy is associated with less severe post-operative pain than thoracotomy. Nevertheless the management of analgesia must be adequate to avoid chronic pain occurrence (1). Paravertebral administration of adjunctive analgesics to local anaesthetics has shown efficacy after breast surgery (2). The aim of this study was to determine if adding sufentanil to ropivacaine improves analgesia compared to plain ropivacaine in continuous thoracic paravertebral block during 48 hours after video-thoracoscopic surgery.
**Materials and methods:** In a double-blinded, prospective study, 88 patients having minor thoracoscopic surgery (lung or pleurae biopsy, pleurodesis) were randomly allocated to 2 groups: ropivacaine 2 mg/ml (group R) and ropivacaine 2 mg/ml with sufentanil 0.25 μg/ml (group RS), both in a continuous paravertebral infusion mode at 0.15 ml/kg/h. Cumulated doses of post-operative self-administered morphine at 48 hours was the primary outcome measure. Visual Analogue Scale scores (VAS), side effects and satisfaction scores were recorded at 2, 12, 24, 36 and 48 hours after surgery. Length of hospital stay (LOHS) was recorded. Non parametric bilateral Wilcoxon-Mann-Whitney test was used for statistical analysis.




*[Morphine consumption and VAS scores]*

**Results and discussion:** Data from 70 patients were analysed (n=37 in group R, n=33 in group RS). Demographic data were comparable in both groups. Morphine consumption and VAS scores (graph), incidence of side effects and satisfaction scores showed no statistically significant difference between the groups. There was no significant difference in LOHS between group R and RS (6.0 days [3.0-34.0] vs 7.0 days [3.0-34.0] respectively, p=0.21).
**Conclusion(s):** adding sufentanil to ropivacaine does not improve analgesia when compared to plain ropivacaine in continuous thoracic paravertebral block during 48 hours after video-thoracoscopic surgery.
**References:**
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## 09AP06-6

### Local infiltration analgesia (LIA) gives superior analgesia compared to epidural analgesia after total knee replacement

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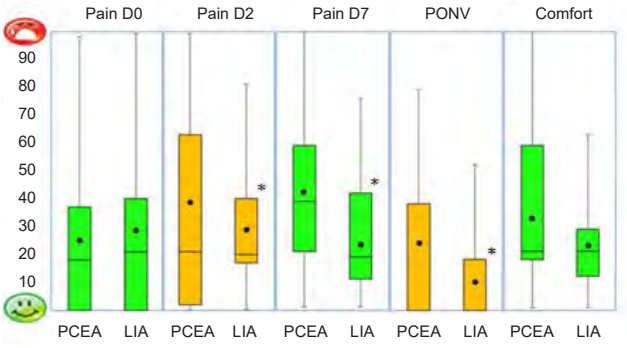
**Background:** Local infiltration analgesia (LIA) is an emerging alternative for patient controlled epidural analgesia (PCEA) for postoperative pain relief after total knee replacement. LIA allows faster mobilisation - with beneficial orthopaedic results-, obviates an urinary catheter, eliminates the risks of epidural catheters, and fastens patient turnover. Conversely, PCEA is considered the gold standard for pain relief in the first days after this type of surgery. The aim of this observational study was to evaluate patient perception of the quality of analgesia, postoperative nausea & vomiting, and general comfort.
**Materials and methods:** 81 patients undergoing a total knee replacement between April and July 2015, were asked about pain scores at D0, D2, and D7, PONV, and general comfort. 40 patients received PCEA and 41 patients received LIA (70ml Ropivacaine 2%, ketorolac 30mg and adrenaline 0.4mg). All surgeries were performed using the same surgical technique by two orthopaedic surgeons, under a standardised general anaesthesia. Spinal anaesthesia with 2.5 ml levobupivacaine 0.25% was given prior to induction of narcosis, associated with either PCEA (levobupivacaine/sufentanil)for three days, or LIA during surgery, according to the preference of the surgeon. A strict protocol for other analgesic medication (paracetamol, NSAID and tramadol) was applied in all patients in both groups.
**Results and discussion:**




*[Box plot of scores. * = significant difference]*

Figure 1 summarizes the results in box-plots. The dots represent the average values.
At D0, no significant difference in pain scores was reported. Patients in the LIA group reported significantly better pain scores at D2 and D7 and PONV scores. General comfort was not significantly different (F-test : P=0.054). In addition to significantly better average scores in the LIA group, a remarkably favourable 75th percentile for most questions indicates a much lower incidence of the most extreme discomfort in this group.
**Conclusion:** In addition to faster mobilisation of the patients and elimination of the risks and burden of an epidural catheter and PCEA, LIA delivers equal to better analgesia, and better PONV and general comfort scores.

## 09AP06-7

### Ketamine for postoperative analgesia in radical prostatectomy in combination with morphine, tramadol plus electroacupuncture technique or nalbuphine

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**Background and Goal of Study:** The aim of this study was to compare the efficacy of postoperative analgesia and the incidence of adverse effects with intravenous (iv) administration of tramadol plus ketamine in combination with electroacupuncture (EA) technique versus the iv administration of opioids (nalbuphine or morphine) plus ketamine in patients undergoing radical prostatectomy (RP).
**Materials and methods:** 105 patients scheduled for RP were randomly assigned in 3 groups. In Group 1 (n=35) morphine was administered [bolus dose (BD) 0.05mg/Kg and continuous infusion (CI) mg/24h=18-(agex 0.15)], in Group 2 (n=35) tramadol (BD 1.5mg/Kg and CI 0.15mg/Kg/h) with EA technique and in Group 3 (n=35) nalbuphine (BD 0.5mg/kg and CI 0.15mg/kg/h). In all groups ketamine was also administered (BD 10mg and CI 0.15mg/Kg/h). Infusion pumps were designed to provide 24h postoperative pain relief. In Group 2 a certified acupuncturist placed needles into the LI4 point at a 2cm depth in both hands when the closure of the abdominal walls was initiated. EA was applied for 30min using an EA stimulator at a 100Hz frequency and a constant pulse program. EA was administered again at ST36 and LI4 points for 30min at a 4Hz frequency just after patient extubation. Pain intensity was evaluated at 6h and 24h postoperatively with Numerical Rating Scale at rest and movement. Rescue analgesia and adverse effects were also assessed at 6h and 24h postoperatively.
**Results and discussion:** Demographic data were similar among groups. Patients in group 2 presented statistical significant lower pain scores at rest at 6h and 24h postoperatively compared to group 1 and 3 ($p<0.05$). At movement at 6h and 24h postoperatively group 1 showed statistical significant higher pain scores compared to group 2 ($p<0.05$), while there was no significant difference between other groups assessments. Analgesic consumption was significantly higher, at 24h in group 3 compared to groups 1 and 2 ($p<0.05$). No statistical difference between groups was noted concerning adverse effects except for bowel movement where Group 2 showed significant faster bowel movement, at all time intervals, compared to group 1 and 3 ($p<0.001$).
**Conclusion:** In patients undergoing RP, the use of EA technique with the combination of iv administration of tramadol plus ketamine was more effective concerning postoperative pain relief and analgesic consumption compared to iv administration of nalbuphine or morphine in combination with ketamine.

## 09AP06-8

### Impact of adding ketamine to an opioid in a PCA device for the control of postoperative pain. Systematic review and meta-analyses of randomised-controlled trials

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**Background and Goal of Study:** Benefits and risks of adding ketamine to an opioid in a PCA device in the surgical setting remain unclear. The aim of this systematic review was to examine the impact of ketamine-opioid combinations on postoperative analgesia, cumulative opioid usage, and drug-related adverse effects.
**Materials and methods:** We searched MEDLINE, Cochrane and EMBASE up until May 2015 for fully published, randomised controlled trials comparing opioid-based intravenous PCA with and without ketamine. Trials in adults or children undergoing surgery with general or regional anaesthesia were eligible. Setup of the PCA pump (bolus, lock-out, background infusion) was not a selection criteria. Included trials had to report on cumulative opioid dose, pain intensity, or opioid or ketamine related adverse effects. Trials where patients underwent surgery under sedation only, where ketamine was administered pre- or intraoperatively or via another route than an IV PCA pump, animal studies or abstracts were not considered. Meta-analyses were performed when data were available from at least three studies or at least 100 patients.
**Results and discussion:** We included 18 trials (1209 adults, 104 children). Opioids used were morphine (14 trials), fentanyl (2), tramadol (1), and hydromorphone (1). Bolus doses of ketamine ranged from 1 to 5 mg. The addition

of ketamine reduced 24 hour cumulative opioid consumption (6 trials, 355 patients; WMD -15.0 mg [95%CI, -24.4 to -5.0]), 24 hour visual analogue scale (VAS) pain scores at rest (8 trials, 455 patients; WMD -1.1 cm [95%CI, -1.7 to -0.5]), and the need for rescue analgesia (9 trials, 785 patients; 27.5% *vs* 34.4%,OR 0.46 [95%CI, 0.22 to 0.96]). Ketamine also reduced the incidence of desaturation (3 trials, 155 patients; 0% *vs* 19.2%, OR 0.07 [95%CI, 0.01 to 0.4]), and the incidence of postoperative nausea and vomiting (PONV) (7 trials, 438 patients; 27.3% *vs* 45.4%, OR 0.43 [95%CI, 0.29 to 0.65]), but had no impact on the incidence of urinary retention, nausea alone, pruritus, respiratory depression, or hallucination.
**Conclusions:** Adding ketamine to an opioid in an IV PCA device improves postoperative analgesia and reduces the amount of opioid required. The risks of PONV and of desaturation are decreased and there is no impact on the risk of hallucination. The optimal ketamine regimen remains to be determined.

## 09AP06-9

### The effects of parecoxib on movement-related pain following major gynecological surgery

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**Objective:** Early mobilization is a key element of early recovery after surgery protocols and contributes to improved outcomes following surgery. Parecoxib, an injectable cyclooxygenase-2 (COX-2) inhibitor, is approved in over 80 countries for the management of postoperative pain but few studies have specifically examined its effects on movement-induced pain.
**Methods:** Data were pooled from two clinical trials to examine parecoxib's effects on movement-related pain following major gynecological surgery. Results were compared between treatment groups receiving a single IV dose of placebo (n = 87), morphine 4 mg (n = 82), ketorolac 30 mg (n = 83), parecoxib 20 mg (n = 79), or parecoxib 40 mg (n = 79) on the first day following surgery.
**Results:** Mean pain intensity scores were significantly lower for all treatments compared with placebo at 0.5-1.5 hours post dose of medication (all $p < 0.05$) with the exception of parecoxib 20 mg at 0.5 hours. Mean pain relief scores were also significantly better for all treatments compared with placebo at 0.25-1.5 hours post dose of medication (all $p < 0.05$) with the exception of parecoxib 20 mg at 0.25 hours. However, in contrast to morphine, the ketorolac and parecoxib groups continued to exhibit significantly better pain intensity and pain relief scores relative to placebo at 2.0-24 hours (all $p < 0.05$). The median time to achieve a $\geq$ 50% decrease in baseline pain intensity was significantly quicker ($\leq$ 26 minutes) for all treatments compared with placebo (45 min) (all $p < 0.05$). Finally, patient evaluation of study medication scores at 24 hours were significantly better for all treatments compared with placebo (all $p < 0.05$) but the ketorolac and parecoxib groups exhibited significantly better scores compared to the morphine (all $p < 0.05$).
**Conclusions:** Though all treatments significantly reduced movement-induced pain in the first 2 hours following major gynecologic surgery, the parecoxib 20 mg, parecoxib 40 mg, and ketorolac 30mg groups produced significantly greater pain relief compared to morphine 4 mg over the full 24 hour evaluation period. Generally, there was little difference in efficacy between parecoxib 40 mg and ketorolac 30 mg over the course of the study. Sponsored by Pfizer Inc.

## 09AP06-10

### Safety and efficacy of sufentanil sublingual 30 mcg tablets for the treatment of acute pain following outpatient surgery

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**Introduction:** The sufentanil sublingual tablet system is a non-invasive, patient-controlled analgesia product that received EU marketing authorization in September 2015. A second sufentanil product, a 30 mcg tablet (ST30) dispensed sublingually by a healthcare professional, is in Phase 3 development for treatment of moderate-to-severe pain in settings such as ambulatory surgery or emergency medicine. Sublingual sufentanil appears well-suited for short duration acute pain management because it acts rapidly, does not require an invasive route of delivery and possess a predictable off-set. The primary objective of this study was to compare the efficacy and safety of ST30 to placebo (PT) for the management of moderate-to-severe acute pain following outpatient surgery.
**Methods:** The study was randomized and placebo-controlled for up to 48 hours in adult patients undergoing abdominoplasty, open tension-free inguinal hernioplasty or laparoscopic abdominal surgery. Following Ethics Committee approval and patient informed consent, approximately 160 patients were randomly assigned to treatment with ST30 or PT. Efficacy was assessed by patient reports of pain intensity on an 11-point numerical rating scale (0 = no pain, and 10 = worst possible pain) and the primary efficacy variable was the time-weighted summed pain intensity difference to baseline over 12 hours (SPID12). Key secondary endpoints included total pain relief (TOTPAR) and patient and healthcare professional global assessments (PGA and HPGA). Safety was assessed via vital signs, adverse events (AEs) and the use of concomitant medications.
**Results:** A total of 161 (107 ST and 54 PT) patients were randomized and received study drug. Average patient age was 41 years; 68% were female. Statistically significant SPID12 differences were observed in favor of ST over PT (25.8 vs. 13.1; $p<0.001$), demonstrating superiority for management of acute post-operative pain. Several secondary endpoints also met statistical significance in favor of ST including TOTPAR, PGA and HPGA ($p\leq0.001$ for all). Nausea, headache and vomiting were the most common treatment-emergent AEs across both treatment arms.
**Discussion and conclusion:** The sufentanil sublingual 30 mcg tablet has demonstrated benefit over placebo as a non-invasive analgesic modality in the post-operative setting. Global assessment results by patients and healthcare professionals suggest the therapy is effective, well-tolerated and easy to administer.

## 09AP06-11

### The analgesic efficacy and safety of the association tramadol-bupivacaïne versus morphine-bupivacaïne in epidural thoracic analgesia for thoracotomy

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**Background and Goal of Study:** The objective of this study is to compare the analgesia efficacy and side effects produced by tramadol vs morphine in association with bupivacaïne in epidural thoracic analgesia for thoracotomy.
**Materials and methods:** It is a prospective, randomized, double blind study concerning forty patients scheduled for thoracotomy randomized after anesthesia induction in two groups:
· Morphine group (n=20): a 2,5 ml of bupivacaïne (0,5%) + 3 mg of morphine diluted in 6 ml of physiological serum received by the epidural catheter. The epidural analgesia was kept maintained by 6ml/h of bupivacaïne 0,125 % + morphine 0,01 mg/ml.
· Tramadol group (n=20): a bolus of 2,5 ml of bupivacaïne (0,5%) + 100 mg of tramadol all diluted in 6 ml of physiological serum. The epidural analgesia was maintained by 6ml/h of bupivacaïne 0,125 % + tramadol 0,5 mg/ml.
A post operative evaluation included pain intensity (EVA), degree of sedation, arterial blood gaz and side effects was done throughout 48 hours.
**Results and discussion:** The primary outcome of this study was that the total consumption of bupivacaïne, the number of boluses and analgesia scores at rest, during coughing and during respiratory physiotherapy were comparative in both groups. Patients in tramadol group were less sedated within the first 4 hours (p: 0,02-0,05) and had less respiratory depression within the first 6 post operative hours (p:0,007-0,05). Nausea, vomiting, pruritus and urinary retention were comparative in both groups.
**Conclusion(s):** Our study showed that after thoracotomy, the post operative analgesia provided by tramadol associated with bupivacaïne by epidural thoracic catheter was similar to that with morphine. The risks of sedation and respiratory depression were less for the patients receiving tramadol than morphine.

## 09AP06-12

### Epidural ketamine for postoperative analgesia after urologic surgery

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**Background and Goal of Study:** The use of epidural analgesia for the management of postoperative pain has evolved as a critical component of multimodal approach to achieve adequate postoperative analgesia. Small doses epidural ketamine may be a useful addition in pain management regimens. Among the receptors implicated in the nociceptive transmission, the *N*-methyl-d-aspartate (NMDA) receptor plays a critical role in neuronal plasticity leading to central sensitization and acting on the intensity of perceived postoperative pain. The study was designed to evaluate the effect of small doses ketamine in a multimodal regimen of postoperative epidural analgesia.
**Materials and methods:** In this prospective study were randomized 34 patients undergoing cystectomy and radical prostatectomy under general anesthesia in a combination with continuous epidural anesthesia at the end of surgery. Patients were randomly assigned into 2 groups of 17 patients each. Group A received ropivacaine with fentanyl for postoperative analgesia, group B received ropivacaine with fentanyl plus ketamine (0.2mg/ml) for epidural analgesia. Additional postoperative analgesia was provided by IV morphine. Pain scores and morphine consumption were recorded over 48 h. The maximal degree of physical activity tolerated was recorded daily.
**Results and discussion:** The ketamine group required significantly less morphine than the control group (45 ± 20 mg versus 69 ± 30 mg; $P < 0.02$). Patients in the ketamine group were roused more rapidly than those in the control group (at 7 [5-11] versus 12 [8-45] days, median [25%-75% interquartile range]; $P < 0.03$). No patient in either group reported sedation, hallucinations, nightmares, or diplopia. Continuous lumbar epidural analgesia is considered the analgesic technique of choice after cystectomy and radical prostatectomy. However, thes technique provides incomplete postoperative analgesia with additional i.v. morphine required. Our primary result is that simply adding an infusion of small-dose ketamine epidurally for 48 postoperative hours reduced morphine requirement by 35% and allowed faster postoperative mobilisation. Possible explanations of this phenomenon could be the effect of ketamine on the peripheral NMDA receptors and a central antihyperalgesic effect of ketamine.
**Conclusion:** The results of the study confirm that ketamine is a useful analgesic adjuvant in postoperative epidural analgesia after cyscectomy and radical prostatectomy.

# Chronic Pain and Palliative Medicine

## 10AP01-1

### Block superficial cervical plexus to relief chronic neuropatic pain

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**Background:** The frequency of postsurgical chronic pain in head and neck cancer is often underestimated, being marked between 20-30% by several authors[1-2]. The causes can be either due to disease, or due to surgical changes, and its treament is often conservative.
Our goal is to show how the superficial cervical plexus can be targeted to apply some techniques used in pain practice[3].
**Case report:** A 45 year old patient suffering from chronic neuropatic pain for 3 years, secondary to neck dissection. Poor relief with conservative treatments. Basal scores: VAS:10, DN4: 8 and LANSS: 21. Exploration evidenced allodynia, dysesthesia and hypoesthesia. Radiological images didn't show any change that could justify the situation.
After informed consent we did a diagnostic blockade at C4 level with local anesthetic and non-particulate steroid. One month after, VAS value was 1, DN4: 3 and LANSS of 5. 2 months later, after pain returned to basal values we apply pulsed radiofrequency (PRF) in different plexus levels for 8 minutes, 40 Hz, controlled at 42ºCelsius.
After that we applied 2 mL of levobupivacaine 0,125% and 4 mg of dexametasone.The patient was followed 3 (V2), 6 (V3) and 9 months (V4) after the procedure: VAS V2:2, VAS V3:2, VAS V4:2, DN4 V2:2, DN4 V3:2, DN4 V4:2, LANSS V2:5, LANSS V3:5, LANSS V4:5.
**Discussion:** The relief achieved with pulsed radiofrequency shows it could be an effective way to treat several neuropathic symptoms. The exact voltage and duration of the radiofrequency must be investigated to develop the most effective way to treat head and neck chronic pain.
**References:**
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**Learning points:** The frequency of postsurgical chronic pain in head and neck cancer is often underestimated, being marked between 20-30% by several authors[1-2]. The causes can be either due to disease, or due to surgical changes, and its treament is often conservative.

## 10AP01-3

### Cervical high density spinal cord stimulation: worthwhile a trial in post-laminectomy syndrome

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**Background:** Conventional spinal cord stimulation (SCS) is used to treat cervical post-laminectomy syndrome (PLS) (1). The exact pain-reducing mechanism is still under research. At the present different stimulation options are investigated. Changing the frequency can alter the effect, 10kHz being promising (2). We present a case where we reprogrammed internal pulse generator (IPG) to deliver high density SCS after the effect of conventional SCS disappeared.
**Case report:** A 58-year old woman had a relapse of neuropathic neck and arm pain 2 years after successful conventional SCS (2 electrodes, Medtronic Prime Advanced battery) for PLS. Reprogramming the IPG was unsuccessful. We switched therapy to high density SCS (130Hz, 450$\mu$s in both electrodes). This markedly reduced the neuropathic neck and arm pain (Table 1). Additionally, high density stimulation was perceived as more comfortable.

| Time (t) | NRS Cervical pain | NRS Left arm pain | NRS Right arm pain |
|---|---|---|---|
| Before conventional SCS | 7 | 7 | 7 |
| 1 electrode t=0 | 2 | 8 | 2 |
| 2 electrodes t=48 days | 5 | 3 | 2 |
| Control t=15 months | 6-7 | 6 | 3 |
| After High Density SCS t=20 months | 4-5 | 4 | 0-2 |
| 3 months after High Density SCS | 2-3 | 3 | 0-1 |

*[Table 1. NRS at different time points during SCS]*

**Discussion:** Conventional SCS is used to treat refractory radicular pain. However, sometimes the analgesic effect dissipates for unknown reasons (3). Reprogramming the IPG to high density stimulation produced excellent pain relief in our patient.

**References:**
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**Learning points:** This case report shows that fading effect of conventional SCS can be salvaged by high density stimulation with a minimal cost and risk for the patient. Larger trials are needed to confirm our findings.

## 10AP01-6

### Occipital central segmental blockade in cervicogenic headache treatment

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**Background and Goal of Study:** Cervicogenic headache (CGH) is classified by the International Headache Society (IHS) accounting for 15-20% of all chronic and recurrent headaches [1-3].
**Materials and methods:** 36 patients with CGH who attended the clinic in September 2014-August 2015 were randomized into two comparable groups (18 patients each) by the sealed envelope method in a randomized double-blinded placebo-controlled study, that was approved by the Institutional Review Board.CGH diagnosis was based on International Classification of Headache Disorders criteria.
**Patients:** The study group received oral lornoxicam 16mg/day, tizanidine 8mg/day during 10 days and three greater occipital nerve blocks with 2ml 2% lidocaine and 1ml dexamethason one per 3 days. The control group got the same drug therapy and received 3 NaCl injections one per 3 days. The effectiveness criteria included the pain severity estimated by Visual Analog Scale (VAS) and the certain pain episode duration that were analyzed on first and 10$^{th}$ days of treatment.
**Results and discussion:** The patients' mean age was 41.7±4.8 in the study and 45.1±6.4 in the control groups. Both groups mostly consisted of mails - 11 in the study, 10 in the control groups. VAS pain intensity at admission was 5.9±1.3 and 6.2±1.5, whereas the pain severity was 6.2±1.3 and 5.9±2.0 hours in the study and control groups respectively. 10 days after treatment VAS pain intensity was significantly higher in the control group and was 2.7±0.8, while in the study group this figure was 1.3±0.4 ($p<0.05$). Apart from this, the pain episode duration lowered to 0.8±0.2 and 2.6±0.3 hours in the study and control groups respectively.
**Conclusion(s):** Greater occipital nerve blockades with 2ml 2% lidocaine and 1ml dexamethason may help in CGH patients pain syndrome treatment.
**References:**
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## 10AP01-7

### Ultrasound - assisted lumbar interlaminar epidural injections: an evaluation of flow of dye in cadavers confirmed by anatomical dissection

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**Background and Goal of Study:** Epidural steroid injections have been used for treatment of lumbar radicular pain syndrome for many years. The delivery of steroid could be completed using pre-procedure ultrasound examination. The aim of the study was to evaluate the flow of dye in the epidural space after lumbar midline interlaminar injection in cadavers.
**Materials and methods:** After obtaining institutional approval for the usage of cadavers, 24 cadavers were included . All the cadavers received ultrasound - assisted injection using loss of resistance technique. The lumbar midline interlaminar injection was made on the cadavers lying prone position in the L4-L5 level. According to the volume of dye all the cadavers were allocated in two groups: 3 and 6 ml. Then a bilateral incision of the facet joints level was made, the spine was dissected and the dorsal part of the spine from cervical to the sacral region was evacuated to visualize the epidural space. Accurancy of the needle insertion and patterns of the spread were compared in both groups.
**Results and discussion:** All 24 needles were introduced in selected interlaminar space. In total 24 cadavers 13 received 3 ml of contrast and 11 - 6 ml. Dorsal flow of dye occurred in all 24 injections. A half of the injections resulted in ventral spread - 38% (5 out of 13) in 3 ml group and 64% (7 out of 11) in 6 ml group ($p=0.413$). Bilateral flow occurred in 63% cases, with prevalence in the 3 ml group - 85% (11 out of 13) vs. 37% in the 6 ml group (4 out of 11) ($p=0.044$). The mean number of levels of dorsal flow of dye cephalad from the injection site was 1.77 in 3 ml group vs. 3.00 in 6 ml group ($p=0.046$) and caudad flow 0.60 in 3 ml group vs. 1.43 in 6 ml group ($p=0.493$); the same means for ventral flow were 1.80 in 3 ml group vs. 3.00 in 6 ml group ($p=0.163$) and 0.92 in 3 ml group vs. 1.09 in 6 ml group ($p=0.057$), respectively. There was a significant difference in more cephalad than caudad contrast flow ($p=0.001$). The observed flow of dye need to be studied clinically to determineif this can affect clinical outcome.The overall numjber of cadavers is small, so it should be done with a larger sample size in order to draw overall conclusions.
**Conclusion(s):** All injections were performed in selected interlaminar space. 50 % of the injections observed in the study revealed ventral flow of dye. Bilateral flow of dye occurred in 63% of the injections, more often in the smaller volume group. Caudal flow is less than cephalad.

## 10AP01-8

### Multiple injection technique for intercostal nerve neurolysis

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**Background:** Neurolytic blocks could be employed for prolonged pain relief. They could also help in eliminating many usual opioid-related adverse effects (1,2,3). In this study, we would like to present the neurolysis procedure we performed selectively on 3 different spots on the nerve using multiple injection technique to treat a patient with pain at 3 different spots along the intercostal nerve trace. In the literature search we performed, we did not find any examples for selective neurolysis procedure performed using multiple injection technique on the same nerve in the same session.
**Case report:** A male patient aged 53 was diagnosed with mesothelioma and operated on for tumor resection. After 15 days, he consulted us complaining of very severe pain not responding to medical treatment and preventing his breathing. During the examination, pain on 3 different spots on the intercostal nerve trace was confirmed. Intercostal neurolysis was decided to be performed. Prior to neurolysis, 1% lidocaine was administered on the 3 spots with pain at an amount 1 cc each for diagnostic reasons. It was observed that the patient's pain disappeared. The needles were kept in place and 0.5 cc radiopaque on each spot was administered. That the needles were on the right spots was observed. Then, neurolysis was performed with the administration of 50% alcohol of 1 cc on each spot. Following the procedure, the patient stated that his pain disappeared completely. The patient was followed up for 3 months, which were free of pain.
**Discussion:** In this case, to treat a patient with pain on 3 different spots along the intercostal nerve trace, we performed neurolysis selectively on 3 different spots on the nerve using multiple injection method instead of complete neurolysis with a single injection on the nerve. Thus, we observed that function loss that might occur on the nerve due to the procedure was decreased.
**References:**
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**Learning points:** If there is more than one painful spot at the innervation territory of peripheral nerves, the performance of neurolysis for treatment using multiple injection method instead of single injection method may minimize the function loss that might occur in the nerve.

## 10AP01-9

### Evaluation of the effectiveness of spinal cord stimulation treatment in chronic pain, preliminary results of a prospective study

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**Background and Goal of Study:** Spinal cord stimulation (SCS) is one of the few alternatives we have for the treatment of refractory chronic pain, essentially neuropathic type, which generates indescribable suffering for patients. The precise mechanism of action of SCS is unknown. With SCS we can treat selected patients with good results, although the currently lack of grade I level of evidence and type A recommendation. The main objectives of this research were to evaluate: the effectiveness of SCS on the pain control, the quality of life of the patients and their degree of satisfaction, as well as the risks of using this device.
**Materials and methods:** This is an open, prospective, multidisciplinary, longitudinal, cuasi-experimental study, performed at Pain Unit of Cruces University Hospital, Spain. All patients with indication of SCS were evaluated with validated scales, lab and clinical test before and periodically after the intervention. Statistical analyses of continuous variables were summarized using descriptive statistics. As for the discrete variables a comparison type before and after was made. The mean, variance, median, SEM and SD were calculated and contrasted with the Kolmogorov-Smirnov or Shapiro-Wilks test, as appropriate.
**Results and discussion:** 50 patients were included with Failed Back Surgery Syndrome (n=37), peripheral ischemia (n=2), post-herpetic neuralgia (n=1), peripheral neuropathy (n=4), cardiac ischemia (n=1) and Complex Regional Pain Syndrome (n=5) diagnosis. 64% patients are man; the mean age was 53,5 years old, time of chronic pain before treatment was 36 months of mean. The average follow-up time was 43 months; 7 patients had negative test and 4 explants of the devices were performed, 1 case of infection and 3 due to treatment failure. Visual Analog Scale (VAS) scores before treatment had a median of 8 points, and after treatment values decrease to 4 points. Satisfied patients with symptom relief of at least 50% of its baseline were 88%. Our findings are not definitive because of the small number of patients and the heterogeneity of the study population.
**Conclusions:** SCS treatment is effective in patients with refractory chronic pain and its implantation is a fairly safe procedure with low morbidity. Patients must be carefully selected. Controlled trials are needed to confirm whether SCS is an effective treatment as well as study the molecular basis underlying this process.

## 10AP01-10

### Complications associated with intrathecal continuous infusion baclofen pumps for spasticity treatment - 14 years of experience

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**Background and Goal of Study:** Intrathecal implantation of continuous infusion baclofen pumps (CIBP) for spasticity treatment is not free from complications. [1,2,3] These may be related to surgery (infection, dehiscence of the suture), human errors (over or under-dose by programming errors), pump-related (battery failure, migration or rotation within the pocket) or catheter-related (disconnection, kinking, fracture and catheter tip granuloma). Complications can lead in rare cases to death (for severe infection or baclofen withdrawal syndrome).[2,3] Our study describes complications in patients with CIBP for spasticity treatment.
**Materials and methods:** After study approval by the institutional ethics committee, a retrospective observational study was conducted in patients under treatment in our Chronic Pain Unit, with CIBP. Only patients with complete records were included. 75 patients were evaluated. Collected data were submitted to a descriptive analysis of the variables.
**Results and discussion:** Average years of follow-up was 7.2 (range 0.9 to 13.4 years). 104 CIBP (average 7.4 pumps / year) were placed. Mean time free from complications was 7.9 years. 56% (n = 42) patients had no complications. Battery failure (end of life) occurred in 66.7% (n = 22) patients, intrinsic pump failure in 12% (n = 9) and implant infection in 2.6% (n = 2). Pump replacement took place in 38.7% (n = 29) of patients. Of these, 75.9% (n = 22) had battery failure. Among patients with complications, only 15.2% (n = 5) had a second complication. No differences were found related to sex, age or spasticity cause.
**Conclusion(s):** All registered complications were related to technical failure of the pump, except two patients who presented implant infection. There were no human errors. The most frequent complication was battery failure in 66.7% of cases, also responsible for the largest number of replacements of CIBP (75.9%). There are no records of deaths or events associated with side effects to baclofen.
**References:**
1. N Engl J Med 1989;320:1517-21;
2. Neurochirurgie 2003;49:276-88;
3. J Intellect Dev Disabil 2011;36:207-13.

## 10AP01-11

### Functional outcome of continuous intrathecal baclofen pump infusion in spasticity

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**Background and Goal of Study:** Spasticity is one of the most frequent and incapacitating motor abnormalities present in many patients with neurological disorders. Spasticity assessment requires several scales that allow the identification of its intensity and its influence on functional performance.[1,2] Baclofen is used to treat spasticity. When administered intrathecally -continuous intrathecal baclofen pump infusion (CIBPI) - allows a significant reduction of spasticity, with lower doses of the drug minimizing side effects of oral therapy.[3] This study aims to assess functional consequences of CIBPI in the treatment of spasticity.
**Materials and methods:** After approval by the Ethics Committee an observational retrospective study in patients under treatment in our Chronic Pain Unit with ICIBP took place. Patients with complete records regarding functional assessment of spasticity before and after CIBPI were included. 75 patients were included. Functional assessment of spasticity was performed by the functional scales Ashworth and Penn. Collected data were submitted to a descriptive analysis of the variables and non-parametric tests were performed (Wilcoxon) for comparisons.
**Results and discussion:** From 75 patients analyzed, 62.7% (n = 47) were male and the average age was 45.9 years (range 15 to 75 years). The most common cause of spasticity was stroke (18.8%, n = 14). Scores obtained for both scales were lower after placing the pump ($p < 0.001$ both). Patients with stroke, also presented lower scores in both scales after pump placement ($p = 0.001$ for the Ashworth scale and $p = 0.003$ for Penn).
**Conclusion(s):** In this study we conclude that the CIBPI has a positive impact in the treatment of spasticity with reduced frequency of muscle spasms and rigidity.
**References:**
1. Phys Med Rehabil Clin N Am 2001; 12:733-746.
2. Rev. Neurol 2005; 40:30-33.
3. Sinapse 2003; 2:34-39.

## 10AP01-12

### Deferred spinal cord stimulation system infection

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**Background:**
- Spinal cord stimulation has been used as a chronic pain treatment for decades.
- One of the most frequent complications of this technique is the infection of the simulation system, that may need antibiotic treatment or even the removal of the system, increasing the costs and the patient's drug consumption(1).
- The major part of the reported cases of spinal cord stimulation system infection (SCSSI) have been encountered in the first months after the system placement(1), consequently, the efforts to reduce the infection rate have been focused on the perioperative technique.

**Case report:** We reported a case of a 49 year old woman, who was treated in our Pain Unit for years. She was diagnosed with chronic pelvic pain with urinary incontinence and FBSS. She was treated with sacral stimulation and epidural electrodes with satisfactory results.

After several surgical revisions, last one in June 2013, the patient came to our Unit in April 2015 reporting a new bulk in lumbar region, diagnosed as a nonspecific collection by ultrasound examination. She did not have inflammation symptoms or signs, nor temperature. She only complained about pain in the affected area.

In June 2015, the patient had more hot and painful bulks on lumbar incisions and gluteal areas. The patient also reported dizziness, headache, and neck stiffness. We made a magnetic resonance with this conclusion: "posterior epidural soft tissue thickening between L1-T9, suggestive of infection". We decided to remove the stimulation system and began antibiotic treatment with amoxicillin and clavulanic acid for 15 days. After the treatment, the patient healed completely. We did not obtain positive microbiology cultures, but the magnetic resonance image disappeared after treatment.

**Discussion and learning points:**
- Even though SCSSI typically appears in the first months, it can also appear years after the placement.
- Bulks on lumbar incision are signs of alarm.
- There are no studies published about this clinical presentation, and we do not know if the microorganisms are the same that cause the perioperative infection. In this case the treatment with amoxicillin and clavulanic acid for 15 days and removing the system was enough to solve the problem.

**References:**
1. Kenneth A. Follett, M.D. et all. Prevention and Management of Intrathecal Drug Delivery and Spinal Cord Stimulation System Infections. Anesthesiology 2004; 100:1582-94

## 10AP02-1

### The effect of THIP on the thermal and mechanical thresholds of chronic sciatic nerve cuff injury mice

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**Background and Goal of Study:** Decreased Gamma-aminobutyric acid (GABA)-ergic phasic inhibitory transmission in the spinal cord is thought to be responsible for the development of neuropathic pain. However, the role of GABAergic tonic current in neuropathic pain is unknown. We and others previously reported that a subset of substantia gelatinosa (SG) neurons of the dorsal horn of the spinal cord possess GABAergic tonic current mediated by $GABA_A$ receptor ($GABA_AR$)s containing the α5, δsubunits. Recently, $GABA_AR$ δ subunit preferring agonists 4,5,6,7-tetrahydroisoxazolo [5,4-c]pylidine-3-ol (THIP) has been reported effective to reduce acute thermal pain in normal mice. We have suggested that the $\delta GABA_AR$ mediated tonic current in dorsal horn also plays an important role in the mechanism of neuropathic pain. In this study, we assessed the effect of $GABA_AR$ δ subunit antagonist on the pain thresholds of chronic constriction injury (CCI) mice, a neuropathic pain model mice.

**Materials and methods:** Male ddY mice (4 weeks age) were anesthetized with 3% sevoflurane, a 2-mm long split section of polyethylene tubing (PE-20) was placed around the nerve to induce chronic constriction injury (CCI). To measure pain threshold, we evaluated the mechanical paw withdrawal thresholds and the latency of thermal stimulation by von Frey and Hargreaves tests. Two weeks after surgery, we made intrathecal administration of $\delta GABA_AR$ preferring agonists THIP(0.7μg i.t.)(N=15) or normal saline (NS)(N=15) by double blinds methods, and analyzed the effect on the thresholds of mechanical and thermal stimulation.

**Results and discussion:** CCI mice showed both mechanical and thermal allodynia. Thermal hypersensitivity disappeared by 3 weeks after surgery, on the other hand, mechanical hypersensitivity continued more than three weeks as in a previous study.

Intrathecal administration of THIP induced significantly improved both thermal (4.6±0.8 to 6.6s±1.1s : pre to post) and mechanical (2.6±0.9 g to 5.6±1.6g) thresholds ($p<0.05$). On the other hand, NS did not effect on both thermal (4.2±0.9 s to 4.3±1.2 s) and mechanical (3.1±0.5 g to 3.7±1.0g) thresholds.

**Conclusion(s):** THIP showed effective on both thermal and mechanical hypersensitivity. This might be suggested that $\delta GABA_AR$ mediated tonic current in the spinal cord contribute to the mechanism of neuropathic pain.

## 10AP02-2

### Chronic postsurgical pain susceptibility loci in the brain-derived neurotropic factor (BDNF) gene

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**Background and Goal of Study:** Brain-derived neurotropic factor (BDNF) acts as a pro-nociceptive molecule that regulates downstream processes of pain signaling, such as central sensitization and neuronal plasticity. In a gene association study, we evaluated the role of single nucleotide polymorphisms (SNP) in the BDNF gene for the development of chronic postsurgical pain.

**Materials and methods:** The gene association study was approved by the clinical research ethics committee, and all patients gave written informed consent. Venous blood was collected from 1,152 patients scheduled for a variety of surgical procedures. Long-term follow-up was conducted by structured telephone interview using the brief pain inventory. Patients who reported pain at the wound site at three months after surgery were defined as having chronic postsurgical pain. Associations were analyzed using $\chi^2$ test (PLINK-1.07 software). Multiple testing was adjusted using Bonferroni corrections.

**Results and discussion:** 285 patients (25.4%) reported wound pain at three months after surgery. We genotyped 768 SNPs within 65 pain-related genes using the GoldenGate genotyping assay. Association analysis revealed two SNPs located in BDNF gene (rs6265 and rs1491850) were significantly associated with chronic postsurgical pain with adjusted *p* values of 0.003 and 0.004, respectively. Other clinical factors such as age <65 years, male gender, prior history of pain syndrome and current smokers were found to be significant risk factors for chronic postsurgical pain. The two SNPs had higher population attributable risk (6.25-12.3%) compared with the identified clinical factors (3.71-8.76%).

**Conclusion:** SNPs at rs6265 and rs1491850 in *BDNF* could be used to predict the risk for chronic postsurgical pain.

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## 10AP02-3

### Intrathecal administered high-dose baclofen did not induce histological change in rats

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**Background and Aim of Study:** Intrathecal infusion of baclofen (ITB) therapy for spasticity was approved application of insuarance in Japan at 2006. Recently, ITB is reported to be analgesic effect for chronic pain [1], central pain [2], or CRPS [3] regardless of spasticity. However, there is only little information on baclofen-related neurotoxicity. Therefore, we examined intrathecal baclofen neurotoxicity by histological and neurofunctional analyses.
**Methods:** Thirty-three rats were each randomly injected intrathecally with 0.12$\mu$l/g body weight of either of 400 (400B), 800 (800B), 2000 (2000B), 3000 (3000B), 4000 (4000B), or 8000 (8000B) $\mu$g/ml of baclofen dissolved in saline. Control rats received saline alone. Seven days after the injection, the L2 spinal cord with the anterior and posterior roots, dorsal ganglion, and cauda equina were extracted for microscopy. The hind limbs were evaluated neurologically by walking behavior.
**Results:** Neurohistopathological examination showed no evidence of neurotoxic damage in all groups. Immediately after intrathecal baclofen injection, all rats displayed lower limbs weakness, and couldn't keep normal posture. However, all rats of each group could walk normally within 0.25, 0.25, 1, 1, 4, and 4h after injection in 400B, 800B, 2000B, 3000B, 4000B, and 8000B groups, respectively. None of the rats showed irreversible palsy or required tracheal intubation, even at 8000B. The sensory threshold was no significant difference among the baclofen and control groups at 7 days post-injection.
**Discussion and conclusion:** Intrathecal baclofen produced no histological or neurofunctional neurotoxicity even at 8000B. Our previous studies on 4% bupivacaine neurotoxicity using the same experimental protocol showed nerve damage in rats, and posterior nerve lesions at concentrations approximately 8 times higher than the clinically-used concentration [4], while 8000B is approximately 50 times higher concentration than clinical concentration. These results indicate that intrathecal baclofen is a safe treatment option for chronic intractable pain. However, further investigation is necessary to determine the effects of continuous long-term infusion of baclofen.
**References:**
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2. Anesthesiology 2000;92:876
3. RAPM 2002;27:90
4. RAPM 2005;30:464

## 10AP02-4

### Regulation of GABAergic transmission and chloride homeostasis in pain-relevant brain structures

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**Background and Goal of Study:** Chronic pain causes an inadequate sensitization on subthreshold stimuli at both the peripheral and the central level. It has been proposed that a disturbed chloride homeostasis and consequently altered GABAergic transmission contributes to the development of chronic pain. Changes in chloride homeostasis have been addressed in detail at the spinal level, but the supraspinal level, and in particular the thalamus, which plays a key role in central pain processing, has been largely ignored. The aim of this study is to investigate the region-specific regulation of chloride homeostasis by the cation-chloride cotransporter KCC2 in sub-nuclei of the thalamus (VB: ventrobasal thalamus; NRT: Nucleus reticularis thalami) and its contribution to the development of chronic pain.
**Materials and methods:** Whole-cell patch-clamp recordings were performed in acute mouse brain slices. VB neurons were loaded with a defined chloride concentration and a fluorescent dye for visualization via the recording pipette. Somato-dendritic chloride gradients ($\Delta E_{GABA}$) that were induced by the constant chloride load via the patch pipette and revealed by local GABA uncaging either at the soma or dendrite at different command potentials in voltage-clamp mode, served as a quantitative measure for KCC2-mediated transport.
**Results and discussion:** Immunohistochemical stainings and western blot analysis confirmed a differential protein expression of KCC2 in different sub-nuclei of the thalamus. While the VB showed high levels of KCC2-immunoreactivity, the NRT was almost devoid of a KCC2 signal. In agreement with the protein expression data, electrophysiological recordings demonstrated KCC2-mediated transport in VB, but not in NRT neurons. Bath application of the KCC2 inhibitor furosemide induced a significant decrease in $\Delta E_{GABA}$ in VB neurons, confirming the presence of KCC2-mediated transport.
**Conclusion:** These results identified KCC2 as a main factor in the regulation of chloride homeostasis in the VB. Manipulating cation-chloride cotransporter activity and chloride homeostasis on a central level could be a possible target for the treatment of chronic pain in the future.
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## 10AP02-5

### Epidural corticotherapy effectiveness in IgG4 related disease presenting with epidural inflammatory pseudotumor - a case report

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**Background:** Only few cases of spinal inflammatory pseudotumors have been described in literature. We report the second case of an epidural inflammatory pseudotumor related to Immunoglobulin G4 (IgG4) disease[1] and its response to systemic and epidural administration of glucocorticoids.
**Case report:** A 57 year-old woman presented with dorso-lumbar pain radiating to both thighs and diminished strength in lower limbs, numbness, asthenia and weight loss. Physical examination revealed bilateral paraparesis, lower limbs' muscle strength 3/5, broad based gait and bilateral Babinski signal.
The magnetic resonance (MR) unveiled an epidural mass from D10 to D12, occupying almost all the anteroposterior diameter of the central dorsal spinal canal with cord compression, that was surgically removed.
Three weeks later, the symptoms recurred and a new MR was obtained revealing once more an epidural mass from D10 to D12 that was again surgically excised. A month after surgery, the patient was admitted at the emergency department with similar complaints and a third surgery was performed in order to remove the epidural mass and the surrounding fibrosis. Afterwards, the patient underwent D11, D12 and L1 vertebroplasty and posterior fixation from D10 to L2. IgG4 immunostaining of operative specimens confirmed the diagnosis of IgG4 related epidural inflammatory pseudotumor.
After eight weeks of oral corticotherapy and regular epidural methylprednisolone (125 mg) administration no mass regrowth was observed. For the past two years, the patient remained disease free but experiences recurrent severe lumbar chronic pain accompanied by lower limb paresthesia and diminished strength, probably related to spinal root fibrosis, that gives in to epidural administration of Ropivacaine 0,25% (8 milliliters) and methylprednisolone 80 mg.
**Discussion:** There is scarce information regarding treatment and pain management of epidural inflammatory pseudotumor related to IgG4 disease[2]. We intend to demonstrate our experience with this uncommon and apparently successful route of therapy administration.
**References:**
1. Ezzeldin, M. *et al; Spinal Cord Compression Associated with a Systemic IgG4 Disease;* Neurology April 8, 2014 vol. 82 no.10 Supplement P3.025;
2. Kamisawa,T. *et al*; *IgG4-related disease*; Lancet 2015; 385: 1460-71;
**Learning points:** This case brings additional evidence of corticotherapy effectiveness and displays an unusual treatment option for chronic pain in IgG4 related disease.

## 10AP02-6

### Pregabalin inhibits excitatory transmission in the central amygdala of the mice with inflammatory pain

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Pregabalin (PGB) is used to treat patients with peripheral and central neuropathic pain in USA, Europe and Japan, and with fibromyalgia in USA and Japan. Apart from its selective binding to the α2δ subunit of voltage-gated calcium channels, the targets of PGB in exerting analgesic effects remain unidentified. The central nucleus of amygdala (CeA), a brain region playing

essential roles in emotional memory formation, is now recognized to be a kernel site for the enhanced nociception-emotion link in the chronic pain. The CeA receives inputs from the basolateral amygdala (BLA), one of the brain sites showing the highest expression of α2δ mRNA and [$^3$H]PGB binding[1)], carrying somatosensory information from the thalamocortical network. We examined whether PGB affects the excitatory synaptic transmission from the BLA to CeA in the brain slices prepared from mice with formalin-induced inflammatory pain.

**Methods:** C57BL/6 mice (3-8 weeks-old) were used. Inflammation was induced by injecting 20 μL of 5% formalin into the intraplantar surface of the left hind paw. Acute coronal brain slices were prepared 8 hours post-injection. BLA-stimulating electrode was placed in the ventral BLA near the borderline to the CeA. Electrically evoked excitatory postsynaptic currents (eEPSCs) were recorded from neurons in the laterocapsular part of the CeA (CeL/C) using whole-cell patch-clamp technique. All experiments were carried out at room temperature. PGB was added to external solution and applied in the bath. t-test was used to compare results. All data are presented by the mean ± SEM.

**Results:** PGB (100 mM) significantly decreased the amplitude of eEPSCs in formalin mice (78 ± 8% of before PGB, n=10, P<0.01) but not in naïve mice (99 ± 8%; n=8, P=0.88). This decrease in eEPSC amplitude was accompanied by a significant increase in paired pulse ratio in formalin mice (before PGB, 1.07 ± 0.09; after, 1.27 ± 0.14; n=10, P=0.02) but not in naïve mice (before PGB, 1.01 ± 0.07; after, 1.04 ± 0.06; n=8, P=0.38). These effects recovered after washout.

**Conclusion:** PGB inhibits excitatory transmission from the BLA to CeA partly through reducing release probability only in inflammation conditions. It is likely that the release machinery in the nerve terminals from the BLA would be a potential target of PGB effect especially in the situation where the inflammatory pain elevates excitatory level of the amygdala network.

**Reference:**

1. Trends Pharmacol Sci. 2007, 28(4):151

## 10AP02-7

### The genetic characterization of chronic pain patients and its impact on treatment outcomes

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**Background and Goal of Study:** Recent literature discusses the use of pharmacogenomics in pain management but little describes the genetic profiles of patients and if knowledge of those profiles improves outcomes. We aimed to quantify the distribution of CYP2C19, CYP2C9, and CYP2D6 alleles, in a population of pain patients who underwent genetic testing, and to elaborate if those patients demonstrated a decrease in pain scores after making changes to their prescription.

**Materials and methods:** After institutional review board approval, we obtained records of all patients from the pain center that underwent genetic testing. We noted their demographics and CYP2C19, CYP2C9, and CYP2D6 alleles; results of genetically-identified altered medication metabolism or interaction; medications and dosages; and pain scores.

**Results and discussion:** We identified 70 patients who underwent genetic testing with characterization of CYP2C19, CYP2C9, and CYP2D6 alleles. Average age: 54 years, females: 59%, males: 41%. For CYP2C19: normal 34.3%, intermediate 25.7%, rapid 32.9%, ultra-rapid 5.7%, and poor 1.4%. For CYP2C9: normal 52.9%, intermediate 41.4%, and poor 5.7%. For CYP2D6: normal 57.1%, intermediate 34.3%, and poor 2.9%. The average initial pain score was 8.6 points on a 10-point scale and the average greatest difference of pain scores was a decrease of 4.7 points from a patient's initial presentation to his lowest pain score identified on any one visit.

**Conclusion(s):** the distribution of altered alleles demonstrated a 94% increase in rapid metabolizers with a decrease in normal, intermediate, and ultra-rapid metabolizers in the CYP2C19 allele; a 28% increase in intermediate metabolizers and a decrease in normal and poor metabolizers in the CYP2C9 allele; and an almost equivocal finding of metabolizers in the CYP2D6 allele, compared to control numbers identified in the literature. Patients who underwent genetic testing demonstrated an average 55% reduction in pain scores from initial presentation. Future studies will include at a larger patient population.

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## 10AP02-8

### Female sex hormone may contribute to gender difference in chronic widespread muscular pain

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**Background:** Gender factor could be a major factor in pain perception in different clinical pain conditions, like fibromyalgia, which is female-dominant. Phospho-Erk (p-Erk), a member of MAPK family, is a verified hallmark for neuron-glial activation and nociceptive sensitization in the spinal cord. Till now, the influences of ovarian hormones on Erk activation and fibromyalgia have not been clearly explored.

**Materials and methods:** An acid injection-induced widespread muscle pain(AIMP) animal model was used to mimic fibromyalgia syndrome in human. The female rats were allocated into two groups to receive either ovariectomy (OVX) or sham surgery (Sham). Three weeks later, acid-saline solution was injected to left gastrocnemius muscle twice with a 5-day separation. The changes of nociceptive threshold including mechanical allodynia and heat hyperalgesia were evaluated by von Frey stimulation and radiant heat, respectively. Enhancement of p-Erk in bilateral spinal dorsal horns were compared between groups at different time points. In separate rats, intrathecal injection of Erk inhibitor (U0126) or the vehicle (5% DMSO) was conducted to confirm the involvement of Erk activation. We also extracted dorsal root ganglions (DRG) from the normal rats for *in vivo* primary culture to tested the pathway interactions between Erk activation.

**Results and discussion:** Repeated intramuscular acid injections induced long-lasting mechanical allodynia at bilateral hind paws for at least 2 weeks. We found concomitant escalation of p-Erk protein in the spinal dorsal horn as pain intensity increased over time. The OVX rats had significantly lower mechanical allodynia and p-Erk protein than those in the sham rats. Immunostaining indicated that p-ERK was expressed within spinal neurons.

**Conclusion:** Deprivation of ovarian hormones by OVX mitigates AIMP as well as reduces spinal p-ERK expression in the female rats. Our results demonstrate ovarian hormones contribute to acid injection-induced widespread pain through spinal p-Erk-regulated nociceptive pathways, and can partially explain the role of sexual hormones in fibromyalgia and the importance of p-Erk-mediated mechanism.

**Reference:**

Sluka KA, et al: Unilateral intramuscular injections of acidic saline produce a bilateral, long-lasting hyperalgesia. Muscle Nerve 2001, 24:37-46.

## 10AP02-9

### Anatomical study of sensitive knee innervation in corpses. Therapeutical implications

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**Background and Goal of Study:** The knee is one of the most affected joints by arthrosis processes (especially in old patients). Currently, the application of different types of radiofrequency (cooled and bipolar) have changed chronic osteo-articular pain management.

Anatomical references previously followed for these procedures[1] seem imprecise and need to be revisited[2]. The goal of this study was to determine innervation patterns by anatomical dissection, to improve knee radiofrequency application.

**Materials and methods:** Following previous anatomical guidelines[3], 25 knees were dissected at the Anatomical Laboratory from the University of Santiago de Compostela. Our findings were classified into medial and lateral sides of the knee. The only exclusion criteria was previous prosthesis implantation in the dissected joint.

**Results and discussion:** On the medial side of the knee we identified the following essential nerves:
- Infrapatellar branch of the saphenous nerve.
- Sensorial branches from nerve to the vastus mediallis muscle.
- Cutaneous portion from the anterior branch of the obturador nerve.
On the lateral aspect we identified the following nerves:
- Sensorial branches from peroneal nerve (retinacular lateral nerve and recurrent peroneal nerve)
- Nerve to the vastus laterallis muscle.
- Nerve to the vastus intermediallis muscle.
**Conclusion(s):** Clinical approaches are incomplete. Knee inervation is more complex than was previously assumed. The relationships of sensitive knee innervation are inconstant and are always between muscles and muscle-bone structures. We think ultrasound guidance is the best approach for radiofrequency application in knee joint.
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3. E.Gardner. The innervation of the knee joint. Department of anatomy, college. University of Michigan.
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## 10AP02-10

### Diagnosis and treatment of localized neuropathic pain secondary to keratoacanthoma centrifugum marginatum

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**Background:** We report a case of pain secondary to keratoacanthoma centrifugum marginatum (KCM), diagnosed with screening tool for the diagnosis of neuropathic pain.
**Case report:** A 54-year-old male with a history of type 2 diabetes mellitus, with pain secondary to KCM. He was treated with 5-fluorouracil topical and acitretin, intralesional methotrexate, topical imiquimod 5%, retinoids, radiotherapy and curettage. The patient did not receive analgesic treatment. Pain intensity by visual analog scale (VAS) was 7, accompanied by electric discharge in the back and first finger of right hand related to the cures, and paraesthesia in this area.
On examination, a wound of 20x20 cm was shown, with scar tissue; allodynia and hyperalgesia in the back of the hand and first finger of his right hand. Screening tool was used to diagnose. He was treated with lidocaine patch 5%,and tramadol 50mg one hour before he was cured. An improvement of sensory symptoms and pain were shown by the patient (VAS 3).
**Discussion:** KCM is a rare variant of keratoacanthoma. It is characterised by a progressive peripheral expansion and central healing leaving atrophic scar. To date, only 40 cases have been reported worldwide[1].
In our case, the patient had a localized neuropathic pain that was easy to detect using a new tool for detection of neuropathic pain and the subtype, localized neuropathic pain, the screening tool. It is accurate and easy to use. It consists of four questions, in addition to the information regarding each of these issues, and a detailed algorithm. Spanish and English version are available today in a wallet card form[2].
**References:**
1. Yang Y, Xu Y, Wang L, et al. Two cases of giant keratoacanthoma centrifugum marginatum accompanied by α-human papillomavirus infection. Int J Dermatol. 2015 Aug;54(8):951-4.
2. Mick G, Baron R,Correa G, et al.Is an easy and reliable diagnosis of localized neuropathic pain (LNP) possible in general practice? Development of ascreening tool. Abstract 3145; XXI WCN2013; Sept 2013.
**Learning points:** The literature has forgotten the painful symptoms of KCM that, as in the case presented, can be very disabling for the patient. The use of the screening tool allowed us a quick, easy and effective diagnosis. Treatment guidelines for neuropathic pain consider the presence of localized pain in the choice of first-line treatment, recommending the lidocaine patch 5%.

## 10AP03-1

### Rare severe refractory chronic pain syndrome - T9 anterior cutaneous nerve entrapment syndrome (ACNES) - significantly improved with MC5-A (scrambler therapy-ST)

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**Background:** ACNES incidence is estimated in aprox 1/1800 in general population, cause of up to 1% referrals to general surgeons and sometimes misdiagnosed at the ED or outpatient visits, leading to severe, disabling pain.
**Case report:** A 64 years old female patient was referred to our clinic with anterior wall abdominal pain lasting for 4 years; she described pain free time and severe painful paroxysms( 9-10/10 VAS) while seating or having gym for abdominal muscles, with the pain irradiating along the left T9 intercostal nerve dermatome, backwards to the spine, with abdominal wall tenderness and cold allodynia. Having failed multiple pharmacological and non pharmacological therapies, she had also to change lifestyle and daily family activities, including sleep disturbances and anxiety; pain onset was related to the loss of a family member, retiring from professional activities and some simultaneous body weight variations. With blood analysis, echo and CT imaging studies normal, ACNES was the presumed cause. She refused any local anesthetic(LA) injection, but accepted a ST trial with good results. After 5 consecutive treatments (40 minutes daily) paroxysmal pain was reduced to 1-2/10 VAS and slight discomfort persisted but not affected her any more and required no medication, but psychologic counselling for 4 months.She rejected a therapeutic plan with echo guided LA injections at the entrapement site and/or neurectomy and opted to repeat ST treatments if required.
**Discussion:** Frequently misdiagnosed, ACNES may be a severe neuropathic pain syndrome with serious impact on patients' lives. MC5-A ST, a noninvasive method using skin electrodes that simulate non pain information already tested in many neuropathic pain syndromes significantly improved pain in our patient and was a good option as she refused any injection in the painful area and opted for the ST non invasive management with no side effects and no medication needed.
**Reference:**
Van Assen T et al- Incidence of abdominal pain due to the anterior cutaneous nerve entrapment syndrome in an emergency department, *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine* 2015, **23**:19 doi:10.1186/s13049-015-0096-0.
**Learning points:** ACNES diagnosis is challenging and may be confusing due to its pure neuropathic pain symptoms, with mechanical component due to entrapment. Some chronic cases may be severe enough to affect QoL. ST is a noninvasive innocuous option for patients refusing echo guided therapy.

## 10AP03-2

### Reducing pain and stress with simple grounding or earthing method in bed ridden (palliative care) and in end of life care patients without any drugs

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**Objectives:** Diurnal cortisol secretion levels were measured and circadian cortisol profiles were evaluated in a pilot study conducted to test the hypothesis that grounding the human body to earth during sleep will result in quantifiable changes in cortisol. It was also hypothesized that grounding the human body would result in changes in sleep, pain, and stress (anxiety, depression, irritability), as measured by subjective reporting.
**Subjects and interventions:** Twenty five patients of age group 35- 45 with complaints of, pain and stress during his end stage of life were grounded to earth during sleep for 8 weeks in their own beds using a conductive mattress pad. Saliva tests were administered to establish pregrounding baseline cortisol levels. Levels were obtained at 4-hour intervals for a 24-hour period to determine the circadian cortisol profile. Cortisol testing was repeated at week 6. Subjective symptoms of sleep dysfunction, pain, and stress were reported daily throughout the 8-week test period.
**Results:** Measurable improvements in diurnal cortisol profiles were observed, with cortisol levels significantly reduced during night-time sleep.

Subjects' 24-hour circadian cortisol profiles showed a trend toward normalization. Subjectively reported symptoms, including sleep dysfunction, pain, and stress, were reduced or eliminated in nearly all subjects.
**Conclusions:** Results indicate that grounding the human body to earth ("earthing") during sleep and in bed ridden patients reduces night-time levels of cortisol and resynchronizes cortisol hormone secretion more in alignment with the natural 24-hour circadian rhythm profile. Changes were most apparent in females. Furthermore, subjective reporting indicates that grounding the human body to earth during sleep improves sleep and reduces pain and stress.

## 10AP03-3

### Impact of tapentadol for cancer pain treatment

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**Background and Goal of Study:** Tapentadol (TP) is a centrally analgesic agent acting with 2 mechanisms of action: mu-opioid receptor agonism and norepinephrine reuptake inhibition. TP has been developed for the management of moderate to severe chronic pain, therefore there is paucity of information regarding the efficacy and tolerability in cancer pain management. The present study was performed to clarify the clinical impact of TP therapy for cancer pain treatment.
**Materials and methods:** After obtaining IRB approval, patients with cancer pain in whom TP was prescribed between Sep. 2013 and Jul. 2014 were enrolled. The present study was conducted retrospectively. TP was prescribed to treat either moderate nociceptive pain or neuropathic component based on imaging examination and/or a character of pain. The TP doses were calculated from the previous opioid consumption, with a conversion ratio with oxycodone of 5.0. Pain intensity was evaluated using visual analog scale (VAS; 10cm) before and after administering TP.
**Results and discussion:** Thirty-five patients were enrolled and TP, initial dose was 50-300 mg/day, was prescribed. Five patients were excluded from the analysis due to oral intake failure caused by general physical health deterioration within a few days following TP prescription. Mixed pain mechanisms (nociceptive and neuropathic pain) were found in the 12 patients, pure neuropathic and nociceptive pain mechanisms were observed in 12 and 6 patients, respectively. In 21 patients TP was switched from other opioids. The pain relief could be achieved within 1-13 days following TP administration in 26 patients. The median VAS scores were 8 and 2 cm before and after TP treatment, respectively. Additional pain relief was obtained in 13 patients by increasing doses. There were no TP related adverse events such as constipation, nausea, vomiting and drowsiness. TP was effective and well tolerated in the management of cancer pain. From baseline to the final assessment, individual reductions in pain intensity of at least 50%, were achieved by 87% of the patients, indicating TP could achieve clinically meaningful reductions in pain intensity. TP had a better gastrointestinal tolerability profile than other opioids, with a lower incidence of gastrointestinal adverse events.
**Conclusion(s):** We concluded the benefit ratio of TP appears to be better compared to other opioids.

## 10AP03-4

### Pelvic pain: never forget the anesthesiologist pain doctor. Our experience in the pelvic pain unit

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**Background and Goal of Study:** Chronic pelvic pain (CPP) is a complex disorder that may become self-perpetuating as a consequence of CNS modulation, independently from the original etiology.
Aim of this report is to highlight the importance of the pain therapist, as part of a multidisciplinary approach for CPP, because of his proficiency in treating the above mentioned mechanisms.
**Materials and methods:** Our hospital has a Pelvic Pain Unit (PPU) specifically dedicated to CPP, functioning since January 2013. Our Gynaecologists evaluate the patients and, if their pain intensity score is moderate to severe in a Numerical Rating Scale (NRS), they are referred to our PPU.
We made a retrospective study about the management of 43 patients over a period of 2 years by our PPU.
**Results and discussion:** Endometriosis was the most prevalent pathology in our practice (23 cases, 60.5 %). The main (SD) age was 39,6 (14.5) years old. Patients complained dysmenorrhea (71.1%), dyspaurenia (52.7%), dischezia (39.5%) and dysuria (10.5%). 11 patients (28.9%) referred insomnia and 4 (10.5%) patients depressive syndrome. Patients were treated with acetaminophene (15.8%), NSAID (63.2%), opioids (65.8%) antidepressant (28.9%), anticonvulsivants (5.3%), supplements (18.4%) and estro-progestagens (28.9%). We reduced the habit to abuse of over-the-counter analgesic agents, above all NSAIDs. If their pain was refractory to pharmacologic therapy they received invasive techniques.
2 patients received sequential pudendal nerve blocks with local anesthetics and corticoids US guided, 2 received sequential ganglion impair blocks and subsequent radiofrequency (RF) ablation fluoroscopic guided, 1 patients, believed to suffer from CPP, had an articular facet joints syndrome and underwent a RF ablation of the medial branches, 1 patient underwent spinal cord stimulation.
The preliminary results indicate that patients reported an improvement results in SF- 12 questionnaire, and a median reductions of 30% in NRS; throughout these 2 years of tigh team work around CPP, the percentage of patients refferred by gynaecologists to our PPU has doubled.
**Conclusion:** In the setting of CPP multidisciplinary approach, pain therapist provides advanced management procedures to treat the pain as a disease in its own right, contributing to yield a greater symptomatic improvement.

## 10AP03-5

### A randomized trial of amitriptyline and gabapentin are both effective for neuropathic pain in children

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**Background and Goal of Study:** Amitriptyline and gabapentin are front line drugs for treating neuropathic pain. No pediatric studies have yet compared them directly to determine which drug might be better for relieving pain and sleep disturbances.
Our primary study objective was to compare their efficacy for treating neuropathic pain in children. A secondary objective was to evaluate changes in sleep.
**Materials and methods:** Participants ranged from 8 to 17 yrs. Diagnosis of neuropathic pain was made at Sick Kids Chronic Pain Clinic. ECG's were performed on all patients prior to study to rule out conduction abnormalities. Patients received either gabapentin (300 mg tid) or amitriptyline (10 mg qhs) with capsules matched for size and dosing regimen matched with appropriate placebos for a 6-week, triple-blind (patient, physician, data analyst) RCT. Patients completed weekly interviews to obtain outcomes and attended an in-hospital interview at 6 weeks. Primary outcome was a change in usual (i.e., past week) pain intensity from baseline to 6-weeks as measured by an 11-point Colored Analog Scale.
**Results and discussion:** Thirty-four patients (82% female) were randomized to amitriptyline or gabapentin. Two patients allocated to the amitriptyline group were ineligible due to a contraindicated condition identified at start of trial. Three participants were discontinued from gabapentin and amitriptyline groups (2 and 1, respectively) due to adverse events deemed unrelated to study drugs. The primary analysis was based on 29 patients having completed the study. Mean pain intensity at baseline was comparable for 2 groups: 6.5±1.4 for amitriptyline and 5.0±3.1 for gabapentin. At the end of the 6-week trial, mean usual pain intensity was 5.0±3.1 for amitriptyline (a difference of -1.5 from baseline) and 3.3±2.3 for gabapentin (a difference of -1.7 from baseline). Usual pain scores did not differ significantly between groups ($p > .05$, independent sample t-tests). We also found no statistically significant difference between the two drugs in sleep score, suggesting that both drugs impact sleep score to the same degree.
We conclude that our standard dose of amitriptyline and gabapentin are effective in reducing pain intensity ratings in a 6 week trial for children with neuropathic pain.
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## 10AP03-6

### Postincisional neuropathic pain secondary to abdominal surgery, impact and incidence: effectiveness between lidocaine patch at 5% versus oral pregabalin

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**Background and Goal of Study:** The neuropathic pain (NP) is one of the biggest challenges in the chronic treatment and one of the most promising research áreas in pain. NP is but one type of pain most frequently encountered in clinical practice and a successful treatment remains still distant in many occasions. The management of patients with neuropathic pain is complex and the response to existing treatments is insufficient so in the latest clinical guidelines the topical treatment it is positioned as first-line drug versus classical systemic treatment. This Clinical prospective, randomized study with two branches was designed to analyze the effectiveness of the 5% lidocaine patch versus oral pregabalin.
**Materials and methods:** We included 78 patients in a year period of treatment. 39 in each group. In the group A (pregabalin) the administration was ascendant till reach 300mg/day. The group B (5% lidocaine patch) utilized 1 patchat. All the patients met the inclusión and exclusión criteria. The gender, age, kind of previous surgery, questionnaires (*DN4, VAS, SF12, health thermometer pain(HTP), PGI-I, CGI-I*), complications and side effects were recorded.
**Results and discussion:** There were no differences in demographics. The most frequent side effect in group A was nausea (100%) followed by dizziness (87.5%). The laparotomy and inguinal surgery were associated with more NP (38,5% and 33.3% respectively). In the first visit the DN4: 8 (29%). VAS: 8(39.7%). SF12: 12(21,8%) and 30 (19,2%), HTP: 40(24,4%), PGI: 3(26,9%), CGI 1(35,6%). At the end of the study, the DN4: 2(37%), VAS: 3(35,9%), SF12: 48(26,9%), http: 80(16,7%), PGI: 1(33,3%), CGI: 157,7%). In the different questionnaires we found an improve of quality of life because the pain was controlled and in some cases below VAS 3 without significant statistical differences, which shows an enhancement in the group B.
**Conclusion(s):** The patients in both groups have the same epidemiological characteristics. Different factors determine the referral to pain unit. The most frequent surgery with NP was the laparotomy. As time goes the DN4 and VAS are lower, that means a good response to treatment but always better with lidocaine patch. There were more side effects with pregabalin than the lidocaine patch 44,9% vs 7,7%. The treatment with 5% Lidocaine DNPI proves to be better and produce more treatment adherence than the oral Pregabalin.

## 10AP03-7

### Continued influence of opioid use in the result of lumbar surgery

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**Background and Goal of Study:** The increased use of opioids for pain management, especially in the elderly patient, has led to a population of patients who develop a dependency and tolerance to opioids. Management of pain in the immediate postoperative period is a serious problem of analgesic management. However, not much is known about their influence on the final functional outcome of these patients. The purpose of this study is to assess whether the continued use of opioids affect the outcome in patients undergoing lumbar arthrodesis.
**Materials and methods:** A prospective study was performed on 135 patients with a mean age of 74.5 years (65-87) operated by lumbar arthrodesis for lumbar instability, with more than two years of monitoring. They are divided into 3 groups: I patients who have been treated with opioids for more than six months before the surgery, II patients with opioids for less than 6 months and III without opioids. Excluding patients with an infection of the surgical wound. A statistical analysis comparing different cohorts demographics, perioperative complications, length of stay and functional evolution by EVA scales, Oswestry, SF-6D and COMI in preoperative and 2 years is performed.
**Results and discussion:** Epidemiological data of the 3 groups are similar. The most significant data is that the average stay of patients treated with opioids is longer than patients without them (Table 1). The number of perioperative complications were similar in both groups. Regarding functional status, all have a significant improvement in pain and function, but in the review at 3 months, improvement in patients with no previous opioid is superior. The results for the year and the second year were similar in both groups (Table 1).

| | GROUP 1 | GROUP 2 | GROUP 3 | P |
|---|---|---|---|---|
| VAS COL PRE | 8.2 | 8.3 | 7.7 | 0.394 |
| VAS COL 3M | 3.96 | 4.8 | 3.2 | 0.272 |
| VAS COL 6M | 3.02 | 4.7 | 3.6 | 0.336 |
| VAS COL 1A | 3.01 | 3.62 | 3.2 | 0.536 |
| VAS COL 2A | 3.8 | 3.6 | 2.6 | 0.609 |

*[Table 1]*

**Conclusion(s):** Patients being treated with opioids have a higher average stay and functional improvement is slower. Functional results were equal to 6 months and maintained over time.

## 10AP03-9

### Gabapentin in the chronic lumbar *radiculopathy* treatment*: a* randomized double-blinded placebo-controlled study of its efficacy

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**Background and Goal of Study:** Lumbar radiculopathy is a type of neuropathic pain and is one of the most difficult pain syndromes[1,2]. According to this administering gabapentin as a first-line drug for neuropathic pain treatment is quite reasonable[3].
**Materials and methods:** In this randomized, double-blind, placebo-controlled trial, 64 patients with subacute lumbar radicular pain received oral placebo (control group, n=32) or *gabapentin* 300 mg (study group, n=32) three times per day for 21 days. Pain intensity was measured by visual analogue scale (VAS) and Neuropathic pain diagnostic questionnaire (DN4) on the first, seventh and 21st days of treatment. Moreover, drugs side-effects and the need of extra analgesics (tramadol 50 mg up to 2 times daily) were taken into account. The data was analyzed with IBM SPSS Statistics and MS Excel software. Data are presented as means ± SEM. The study was approved by the Institutional Review Board.
**Results and discussion:** Pain duration was 4.3±0.5 in the study and 4.8±0.7 in the control group, whereas VAS intensity was 5.1±0.9 and 4.9±0.8 respectively and DN4 scores were 6.2±1.1 and 6.9±0.9 respectively. After seven days of treatment patients in the study group reported a significant reduction in VAS scores compared to the placebo group (3.7±0.6vs. 5.0±0.9; $P<0.05$), which was more distinctive after 21 days of treatment. DN4 scores also demonstrate the regress of neuropathic pain component in the study group (5.1±0.4 and 6.7±0.8, $p<0.05$ by the seventh day and 2.3±0.2 and 6.6±1.0 by the 21st days of treatment in the study and control groups respectively). The daily tramadol dose was significantly lower in the gabapentin group - 27.3±8.6 mg vs. 87.4±16.3 mg in control group on the seventh day, $p<0.05$; 11.5±1.4 mg and 86.7±12.4, $p<0.05$ on the 21st respectively.
**Conclusion(s):** Gabapentin is effective drug in chronic lumbar radiculopathy.
**References:** 1. Atalay H. et al. Clin. Drug Investig. 2013;33(6): 401-408.
2. Gnezdilov A. et al. Terap. arkhiv. 2014; 8:70-743. Nikoda V.et al. J. Anesteziol. I Reanimatol. 2010;3:34-37

## 10AP03-10

### Treatment of chronic low back pain with tapentadol

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**Background and Goal of Study:** Chronic low back pain affects around 23% of the European adult population. Often has an associated neuropathic pain component that makes more difficult pain management. Tapentadol represents a new class of centrally acting analgesic with 2 mechanisms of action, u-opioid receptor agonism and noradrenaline reuptake inhibition, this dual and synergistic mechanism contributes to its efficacy in the treatment of nociceptive and neuropathic pain. However, its role in the treatment algorithm is yet to be determined.
The aim of this study is to evaluate the characteristics of neuropathic pain among patients with chronic low back pain that will receive tapentadol in our Service, and examine the effectiveness and safety of this treatment.
**Materials and methods:** 19 patients with chronic low back pain that would receive tapentadol 100-150 mg were interviewed (6 males and 13 females). Interviews were made the day before treatment initiation and four months after. In the first meeting DN-4 and LANSS scores were used to measure neuropathic pain, SF-12 questionnaire for health status and VAS to assess pain intensity. In the second meeting, four months after the beginning of the treatment, SF-12 questionnaire and VAS were used to determine progression and impact of the treatment. Other data collected were age, sex, adverse effects and reasons for discontinuation. Wilcoxon test was applied for statistical analysis.
**Results and discussion:** According to DN4 questionnaire 15 patients (79%) presented neuropathic pain prior to starting therapy (median 4; range 9; 95% CI = 3,39-5,98). In 12 patients (63%) neuropathic mechanisms were likely to be contributing according to LANSS score (median 13, range 24, 95% CI 8,55-15,45). Adverse effects leading to discontinuation were observed in three patients ( nausea in 1 patient and anxiety in 2). Finally, 10 patients had improvements in VAS ($p < 0,01$) and all SF-12 parameters ($P < 0,01$).
**Conclusions:** The majority of our patients that were going to be treated with tapentadol in our Service presented neuropathic pain *characteristics. No severe adverse effect was observed* throughout the study. Most of our patients showed a decrease in VAS score and an improvement in quality of life according to the SF-12 *questionnaire. In our experience tapentadol is effective and safe in the treatment of chronic low back pain.*

## 10AP03-11

### Hydromorphone overdose in a patient with chronic noncancer pain

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**Background:** Opioid use in cancer, intraoperative and postoperative pain is undisputed. However, their use in long-term chronic noncancer pain (CNCP) management is controversial. Major concerns are effectiveness, addiction potential and safety[1]. The case presented is a reminder of this problematic.
**Case report:** We report a case of 75 year old male, seen at the Chronic Pain Unit (CPU) since 2008 with Chronic Low Back Pain due to bone degenerative disease. He was submitted to several back surgeries without pain improvement. In 2012 was diagnosed with Failled Back Surgery Syndrome. Throughout the years several methods for pain control were attempted, not always with the patients full cooperation given his constant search for fast and total absence of pain. The methods used included several systemic opioids and in 2 different occasions the patient was diagnosed with opioid abuse presenting with prostration, without the need for further intervention. The scheme that best suited this patient included the use of fast and short acting opioids (sublingual fentanyl). The patients' medical assistant was changed, and the new one decided to change to hydromorphone 64mg (x2/day). Two days after this new scheme he was admitted to the emergency with opioid intoxication: he had taken 6 pills of hydromorphone 64mg in one day. He was sleepy, reactive only to verbal stimuli, disoriented, bradypneic. He was given naloxone and was discharged on the 2nd day. After an intense effort from the CPU staff to help him understand what happened and learn how to manage pain, he has been kept on tapentadol 100mg 2id, paracetamol 1g 3id, paroxetine and mirtazapine with relatively good pain control.
**Discussion:** The use of opioids in Chronic Pain, particularly CNCP, has grown exponentially in the past years despite limited scientific evidence to back it up. Simultaneously, there was a considerable increase in opioid abuse and in deaths related to prescribed opioids. Revision studies show little evidence in efficacy of long term opioid use for CNCP and consider inconclusive its' impact in quality of life (QoL) and in function.[2]
**Reference:** 1-Curr Op Anaesthesiol 2010;2-Pain Physician 2012
**Learning points:** This case serves as an alert for this matter and demonstrates the fine line between opioid use for QoL improvement and its' abuse, reminding the medical community of the need for studies to clarify the role and safety profile of opioids in long term CNCP management.

## 10AP03-12

### Meta-analysis of the effectiveness of perioperative ketamine to reduce persistent postsurgical pain

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**Background:** Persistent post-surgical pain (PPSP) is a common and debilitating complication of surgery. In follow up the ENIGMA (Evaluation of Nitrous Oxide in the Gas Mixture in Major Surgery) 1 and 2 Trials, 12% patients reported PPSP at 12 months or more after major surgery.[1] In 1/3 of cases, patients rated their pain as severe. A number of drugs and interventions have been studied to reduce this risk, including N-methyl D-aspartate (NMDA) receptor antagonists, lignocaine and gabapentinoids. However, a recent Cochrane Review concluded that ketamine was the only agent with evidence of a potential benefit in preventing PPSP.[2] Ketamine is a non-selective potent NMDA antagonist commonly used as a second or third line agent for refractory acute postoperative pain. We recently concluded an 80 patient pilot study for a large Phase 3/4 multicentre randomized trial of ketamine and PPSP, and performed an updated meta-analysis including our data.
**Materials and methods:** A systematic PubMed literature review was performed of papers reporting clinical studies that investigated the effect of IV ketamine on long term postsurgical pain using placebo control, as either a primary or secondary trial endpoint. Due to methodological heterogeneity and varied analysis and presentation of data, we chose the incidence at 3-6 months of pain equivalent to a VAS > 3/10 or requiring ongoing analgesic use as the primary endpoint for a pooled analysis. Random effects meta-analysis was done using Stata 12.0 (Stata Corp, USA).
**Results and discussion:** 8 studies ($n = 563$) were found (including our own pilot study) and incorporated in a random effects meta-analysis. Statistical heterogeneity among the studies was moderate, $I^2 = 42\%$, $p = 0.126$. The Risk Ratio [95% CIs] for PPSP at 3-6 months rated at VAS ≥ 3/10 was RR = 0.49 [0.22 to 1.08], $p = 0.078$.
**Conclusion:** A large multicentre randomized trial of the effectiveness of perioperative IV ketamine is warranted. Demonstration of clinical effectiveness would promote widespread change in clinical anaesthesia practice and major economic and other benefits.
**References:**
1. Chan M, et al. Pain. 2011;152(11):2514-20;
2. Chaparro *et al*. Cochrane Database of Systematic Reviews 2013, 7: CD008307

## 10AP04-1

### Are epidural infiltrations associated with the increased rate of postoperative infections?

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**Background and Goal of Study:** The epidural infiltration (IE) is a standard procedure in the conservative treatment of lumbar stenosis and root. Its use is especially common in elderly patients, who generally have multiple comorbidities and those attempting to avoid surgical treatment. However, some series have linked the realization of epidural infiltration with the onset of infection in the immediate postoperative period. The aim of this study was to assess the association between the occurrence of IE and the onset of an infection in patients older than 65 during the first year after a lumbar fusion.
**Materials and methods:** A prospective study was performed on 149 patients with a mean age of 74.5 years (65-87) operated lumbar stenosis with instability associated through a laminectomy and lumbar instrumented arthrodesis with more than one year follow up. They are divided into 3 groups:
I with an IE during the 3 months prior to surgery,
II with IE before 3 months and
III without IE.
Excluding patients with revision of a previous surgery. A statistical analysis comparing different cohorts demographics such as age, sex, BMI, personal history, smoking, Charlson comorbidity index, type of surgery and the presence of postoperative infection is performed.
**Results and discussion:** Epidemiological data of the 3 groups are similar except for a higher rate of smoking in the GI surgeries and prolonged in G-II. The overall infection rate is 6%. The incidence of infection is similar in patients receiving or not IE. The factors that have more influence in the presence of an infection is the type of surgery (longer surgery). (Table 1)

| | GROUP 1 | GROUP 2 | GROUP 3 | P |
|---|---|---|---|---|
| NUMBER | 31 | 38 | 134 | |
| AGE | 76.6 | 73.5 | 74.2 | 0.14 |
| SEX (WOMEN) | 86% | 86% | 75% | 0.107 |
| BMI | 27.43 | 29.38 | 28.65 | 0.533 |
| DM | 19% | 14% | 16% | 0.89 |
| CHARLSON>2 | 28% | 25% | 20% | 0.58 |
| SMOKER | 16% | 7% | 7% | 0.557 |
| SURGERY>180MIN | 24% | 36% | 23% | 0.384 |
| DEEP INFECTION | 6.4% | 5.2% | 5.9% | 0.207 |

*[Table 1]*

**Conclusion(s):** Performing a IE does not expose the patient to a higher risk of complication in the case of needing an operation, so the benefits of the procedure recommend its use.

## 10AP04-2

### Prevalence of chronic pain and risk factors after elective percutaneous coronary intervention in hospital of Lithuanian University of Health Sciences Kaunas Clinics

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**Background and Goal of Study:** Chronic pain is severe complication after Percutaneous Coronary Intervention (PCI). Our study report the prevalence and predisposing factors of chronic pain that lasts more than three months after PCI.
**Materials and methods:** The data were collected of patients who had underwent elective PCI using radial or femoral artery approach in Hospital of Lithuanian University of Health Sciences Kaunas Clinics (LUHSKC) Cardiology department from March to July of 2015. Patients were questioned according to survey made by authors. We interviewed the patients in hospital and then after one week, one month and three months after discharge from hospital. Pain intensity was evaluated according to verbal analogue scales (no pain -NP, mild -mP, moderate - MP severe -SP, very severe -VSP and worst possible pain -WPP). We investigated factors that may have influence the development of chronic pain such as hematoma, body mass index, patient gender, arterial hypertension, arterial bleeding from puncture site, diabetes mellitus, time of cardiovascular disease onset, dyslipidaemia, duration of PCI, fear before procedure, smoking, depression, intervention wound pressure time after PCI. Data analysis was performed with SPSS 23.0. $P<0.05$ were used.
**Results and discussion:** 117 participants of 191 were included in follow-up group. There was 74 males (63.25%) and 43 females (36.75%). Patients mean age - 67.3±10.49 yr. 92 patients (78.63%) were catheterized through radial artery, 25 patients (21.37%) - through femoral artery. There was no statistically significant relation of the results comparing between this two approaches. 14 patients (11.97%) felt pain after 1 week following PCI: 21.43% of them experienced mP, 28.57% - MP, 28.57% - SP, 14.29% - VSP, 7.14% - WPP. 14 (11.97%) patients felt pain after 1 month following PCI: 28.57% of them experienced mP, 42.86% - MP, 28.57% - SP. More than 3 months pain persisted for 4.27% of patients. Most of them experienced MP and SP. Patients characterised the pain as dull (63.64%) or prickling (36.36%).
Statistically significant risk factors of the chronic pain was hematoma ($P=0.047$), body mass index >25 ($P=0.025$), patient age ≥65 yr. ($P=0.024$). Other factors had no significant relation with chronic pain after PCI.
**Conclusion:** Chronic pain developed in 4.27% of cases and risk factors was hematoma, body mass index and patient age.

## 10AP04-3

### The influence of hemodialyis on the pain characteristics of multimorbide hemodialysis patients: a questionnaire study

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**Background and Goal of Study:** Hemodialysis patients suffer from multimorbidity and therefore have a high burden of symptoms. Pain and several other comorbidities were often experienced. However, these symptoms are often under-recognized, although they have a high impact on the health-related quality of life (HRQOL).
**Materials and methods:** The aim of the study was to collect more information about the influence of the hemodialyis on the health of these patients. The study focused on pain and its progress during the hemodialysis. Furthermore the existing comorbidities were identified and the HRQOL was evaluated.
Fifty-eight patients on chronic hemodialysis that met the inclusion criteria were subjects of the study. Patients completed a questionnaire that incorporated the Certkom-Questionnaire, the Brief Pain Inventory, the painDetect and the SF12. Furthermore, the pain intensity was assessed by the numeric rating scale (NRS) every hour during the period of hemodialysis.
**Results and discussion:** Forty men and 18 women were included. Forty-two percent of the patients experienced pain. The mean score [± standard deviation (SD)] for “pain at rest” was 1.4 (+/-2).8 patients had a NRS more than 3 and had to undergo pain therapy. The most common pain was joint pain (31%) and back pain (27%). Back pain was experienced as the most disturbing pain. Movement-related procedures like standing up and walking were the most painful events during the stay at the clinic.Fatigue and lack of energy are often experienced comorbidities. Both the psychological and physiological dimensions of the HRQOL were extremely low. The higher “the average intensity of pain” was, the lower was the evaluated HRQOL.
**Conclusion(s):** Hemodialysis patients suffer from a high symptom burden. Muskuloskeletal pain, fatigue and lack of energy are common comorbidities and need more attention. While off Hemodialysis (HD), these symptoms may be of more importance than during HD. Future investigations should explore these phenomena in order to increase the patients HRQOL.

## 10AP04-4

### Incidence and impact of chronic pain in discharged patients from an intensive care unit

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**Background and Goal of Study:** Pain in the intensive care unit (ICU) patients is frequent, with an incidence of up to 50% in medical and surgical patients at rest and during common care procedures. Evidence demonstrates that adequate pain control is associated with improved patient outcomes in the ICU. This work aims to evaluate the acute pain during hospitalization and investigate the incidence and impact of chronic pain in patients after discharge.
**Materials and methods:** Retrospective study of the incidence of pain during the ICU stay by evaluation of the numeric pain scale (NPS) and the Behavioral Pain Scale (BPS). A questionnaire and telephone follow-up method was used to investigate the incidence of chronic pain, by the application of the Brief Pain Inventory (BPI) in this group of patients. 6 to12 months post-discharged patients were included in the study.
**Results and discussion:** 72 patients were included in this study. During the ICU stay, the maximal pain score observed was 7 in both scales. A score of 0 (NPS) or 3 (BPS) was reported in 41.7% of the patients. Chronic pain was reported in 55.6% of all respondents. Shoulder pain was reported in 22%. Patients with persistent pain after ICU discharge had higher levels of pain assessed during hospitalization (p=0.002). Duration of mechanical ventilation of 5 or more days was associated with chronic pain referred to the shoulder joint (41.2% vs 16.4%; p=0.039). The mean pain score on the BPI questionnaire was 3.2±1.4. 42.5% of the patients referring chronic pain were taking analgesics (88.2% with paracetamol and/or metamizole), with a mean pain relief of 58.8%.
None of these patients was being followed in a pain unit. The mean values of functional interference were 4.3±2.5 on general activity, 3.4±2.4 on mood, 3.2±3.1 on the ability to walk, 3.7±2.3 on normal work, 2.4±1.8 on relations with other people, 2.2±2.3 on sleep and 2.9±2.4 on enjoyment of life.
**Conclusion(s):** Chronic pain has a high incidence in survivors of critical illness after ICU discharge. The systematic assessment of pain and its control are essential as greater levels of acute pain are associated with higher incidence of chronic pain.

## 10AP04-5

### Inguinal hernia repair reoperation and the development of chronic postsurgical pain

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**Background and Goal of Study:** Inguinal hernia repair (IHR) carries risk for chronic postsurgical pain (CPSP). We aimed to assess whether reoperation increased that risk.
**Materials and methods:** The prospective multicenter GENDOLCAT1 study in 23 hospitals (2009-10) included patients aged over 18 yr operated for IHR. To diagnose CPSP we identified patients with pain (telephone questionnaire) 4 mo after surgery and referred them for physical examination and pain history: intensity and location, neuropathic pain characteristics; interference with daily living, physical and mental impact (Short Form Health Survey-12 [SF-12]); analgesics used, and return to work. Patients were telephoned again at 12 and 24 mo. We also recorded age, American Society of Anesthesiologists [ASA] class, and body mass index (BMI).The Mann-Whitney U test for nonparametric variables for independent samples was used for comparisons.
**Results and discussion:** From a database of 1761 cases, we extracted 1652 initial-IHR cases and 109 reoperated cases. Initial IHR patients were younger (mean [SD] age, (58.8 [14.1] yr) than reoperated patients (62.8 [12.6] yr) (P=0.005). The distribution by risk class differed between the 2 groups (initial IHR group: ASA 1, 31.8% [n=524]; ASA 2, 57.5% [n=947]; ASA 3-4, 10.7% [n=176] vs reoperated group: ASA 1, 15.6% [n=17] ; ASA 2, 70.6% [n=17]; ASA 3-4, 13.8% [n=15]) (P=0.002). The mean BMI was identical in the 2 groups at 26.1 (3.3). The CPSP incidence (4 mo) was 13.6% in the IHR group (n=224) and 13.8% (n=15) in the reoperated group (P=0.886). Mean SF-12 physical summary scores in the IHR and reoperated groups were 47.4 (9.1) and 46.2 (8.8) before surgery (P=0.068); preoperative mental summary scores were 55.3 (8.9) and 54.4 (10.1), respectively (P=0.549). Postoperative scores (4 mo) were also similar (physical summary: IHR, 47.6 [9.9] vs reoperated, 45.5 [9.5] [P=0.134]; mental summary: 53.9 [9.2] vs 53.3 [10] [P=0.859]).
**Conclusion(s):** Our findings do not support the hypothesis that IHR reoperation confers additional risk for CPSP. However, our groups were not homogeneous with respect to age and ASA risk status, factors that are associated with the development of CPSP.
**Reference:**
Montes A, Roca G, Sabaté S, Lao JI, Navarro A, Cantillo J, Canet J. Genetic and clinical factors associated with chronic postsurgical pain after hernia repair, hysterectomy, and thoracotomy: a two-year multicenter cohort study. Anesthesiology. 2015(122);1123-41.

## 10AP04-6

### Characteristics of chronic post-surgical pain after hernia repair: data from the GENDOLCAT study

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**Background and aim:** Inguinal hernia repair (IHR) is associated with chronic postsurgical pain (CPSP). We analyzed CPSP characteristics in the first 2 yr after IHR surgery.
**Materials and methods:** Prospective multicenter cohort study (GENDOLCAT[1]) in 23 hospitals (2009-10) in patients aged over 18 yr undergoing elective IHR. Patients with pain were identified by telephone questionnaire 4 mo after surgery and referred to a hospital for diagnosis (pain history and examination). They were telephoned again at 12 and 24 mo to determine the incidence of CPSP, intensity on a numerical rating scale (NRS) and verbal categorical scale (VCS), pain location, characteristics (with the Douleur Neuropathique questionnaire (DN4)); interference with daily living, physical and mental health (Short Form Health Survey-12 [SF-12]), analgesics used, and return to work. Data were expressed as percentages or means (SD).
**Results:** We included 1761 patients (mean age, 53.8 [14.5] yr). CPSP incidences at 4, 12, and 24 mo were 13.6%, 6.2% and 4.1%. The mean NRS score was 3.9 (2.0) at 4 mo; 4 (2.1) at 12 mo, and 4.2 (2.0) at 24 mo. Intense/excruciating pain (VCS) was reported by 9.6%, 16.1% and 16.9% at 4, 12, and 24 mo, respectively. Pain was in the groin in 66.9% and in the scar in 51.2%. At 4 mo, 38.7% had neuropathic pain with the following features: numbness (47.6% of those with neuropathic pain), pins and needles (47.0%), hypoesthesia (45.8%), electric shocks (29.2%), and burning (27.4%). CPSP interfered with activities (18%), work (15.6%), walking (15%) and mood (10.2%). The mean physical summary SF-12 scores of patients with CPSP were 44.5 (9.8) before surgery and 44.7 (9.5) at 4 mo; their pre- and postoperative (4 mo) mental summary scores were 53.9 (9.8) and 52.7 (9.1), respectively. At 2 yr 28.2% took analgesics (acetaminophen, 15.5%; nonsteroidal antiinflammatory drugs, 19.7%; opioids, 2.8%) and 3.8% had not returned to work.
**Conclusions:** CPSP is common after IHR. The incidence of neuropathic pain in this prospective study was menor than other studies. Interference with activities of daily living was also high, and some were still not working after 2 yr. Surprisingly few patients took analgesics.
**Reference:**
Montes A, Roca G, Sabaté S, Lao JI, Navarro A, Cantillo J, Canet J. Genetic and clinical factors associated with chronic postsurgical pain after hernia repair, hysterectomy, and thoracotomy: a two-year multicenter cohort study. Anesthesiology. 2015(122); 1123-41.

## 10AP04-7

### Chronic severe postoperative pain after hernia repair rapidly improved with MC5-A (scrambler therapy-ST)

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**Background:** Chronic postoperative pain (CPP) with neuropathic component is a serious complication affecting, in severe cases daily living and patients' quality of life(QoL); in some medication may offer partial relief, but it may further alter QoL through side effects. Given the good results we achieved with ST in other neuropathic pain syndromes we tried it in this patient, although we found no data on ST use in CPP.
**Case report:** A 63 years old male was reffered to our pain clinic 7 months after a laparascopic inguinal hernia repair. He experienced severe postoperative pain and hyperesthesia at the ilioinguinal nerve dermatome after surgery. Pain intensity increased, further aggravated when seated and became severe (VAS 9-10/10) in 15 minutes. As an IT specialist he could no longer work properly. Current medication was 80 mg Oxycodone SR and 600 mg pregabalin daily and refused oxycodone dose escalation because of somnolence. After pregabalin wash out he had a ST trial, with VAS 1-2/10 during the first treatment. After 3 daily treatments (40 minutes) he could work seated for 4 hours with no pain. After 7 ST treatments with 0 pain for 24 hours and no discomfort when seated he decided to stop further ST. Mild hypoesthesia along the scar persisted. He resumed using Oxycodone in two weeks.
**Discussion:** After hernia repair CPP was signaled in up to 0- 63 % patients with av1.2- 3% having severe, disabling pain. Although pain intensity is fading in time, it may persist > 5 years. Our patient had severe pain, medication side effects and altered QoL (fearing mainly a job loss). ST is a noninvasive method using skin electrodes surrounding the painful area. The machine is simulating non pain information. It was successfully used in other chronic neuropathic pain syndromes. We tried it in this CPP patient with rapid and sustained pain control, no side effects, increased QoL and professional insertion. Patient overall satisfaction with this therapy was quite high.
**Reference:**
Rheinpold W et al: Nerve Management and Chronic Pain after Open Inguinal Hernia Repair, Annals of Surgery. 2011;254(1):163-168.
**Learning points:** Severe CPP is a threat after abdominal wall repair surgery and a neuropathic component should be always sought after in severe, refractory cases. Treatment should follow current guidelines; when side effects are limiting medication use, an ST trial and further treatment may be an option as a noninvasive innocuous treatment modality until sustained pain relief.

## 10AP04-8

### Incidence of chronic pain after minor breast cancer surgery

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**Background and Goal of Study:** Minor breast cancer surgery is usually considered as a non-painful surgery. Pain after tumorectomy + sentinel lymph node is poorly reported in the literature. Thus we carried out a prospective survey aiming at assessing pain three months after minor breast cancer surgery.
**Materials and methods:** This study was approved by the local ethic committee. After information, all patients gave her written consent to participate in this study. In most surgeries a standardized protocol was used (general anaesthesia with no regional analgesia technique, laryngeal mask, sufentanil and propofol for induction, multimodal analgesia during the postoperative period). In the recovery room, a titration of morphine was started in case of pain score above 3/10 on a numeric scale. Three months after the surgery, a questionnaire was sent to the patients with a pre-stamped envelope for return. The questionnaire included: Brief Pain Inventory score and modified neuropathic pain score (DN3). Data are presented as number (%) or mean ± SD or median [$CI_{10\text{-}90\%}$]. A univariate analysis was performed to compare the population according to the presence or not of a persistent pain. $P<0.05$ was considered as significant.
**Results and discussion:** Between 1st January and 31st May 2015, 150 out of 264 patients (age 60 ± 11 yrs, BMI = 25 ± 6 kg/m²) were included in the final analysis. The cancer was located in the external (54%), internal (24%) or multiple quadrants (22%) of the breast. The surgery lasted 62 ± 28 min. In the recovery room, 43% of patients required morphine with a mean dose of 5.2 ± 1.8 mg. 116/150 patients complained pain on the following day. Three months after, 60 patients (40%) reported persistent pain on the breast (37%), the axilla (8%), the arm (12%) or multiple localisations (43%). The pain at its worst in the past 24 hours was 4 [2-7]/10. Analgesic drugs were taken by 62% of patients reporting pain (paracetamol mainly). No risk factor was found to be associated with a persistent pain among the population. Pain interfered the most with general activity, normal work and sleep. A neuropathic pain was noted in 60% of patients reporting persistent pain.
**Conclusion(s):** This prospective study confirmed that pain three months after minor breast cancer surgery persisted in 40% of cases. Morphine rescue in the recovery room concerned 43% of patients. The place of regional analgesia techniques to improve postoperative analgesia needs further investigation.

## 10AP04-9

### Late postoperative pain after total knee arthroplasty: an observational study on 3 different post-operative analgesic techniques

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**Background:** Late post-operative pain is a major problem of total knee replacement (TKR). Our aim was to describe the incidence of neuropathy symptoms and medication consumption 6 months after TKR in patients receiving 3 early postoperative pain treatments: patient controlled analgesia with morphine (MOR), intra articular injection of local anesthetic by orthopedic surgeons - ropivacaine 200mg (IA), and femoral nerve block + MOR (FM).
**Method:** We analyzed charts of consecutive patients undergoing TKR between July and December of 2014. 6 month after the surgery, through a phone interview we assess neuropathy pain using the DN2 questionnaire and collected information on current analgesic medication. We excluded patients with previous neuropathic pain and neuromuscular o psychiatric disease. Data were analyzed using ANOVA and non-parametric test, $p<0,05$ was considered significant.
**Results:** We recruited 63 patients (MOR = 11, IA = 9, FM = 39, excluded 4 due to the use of other analgesic technique). Groups shared comparable demographic characteristics. Pre-operative pain using a numeric scale (NS) and pre-operative medication consumption were comparable between groups ($p=0.83$, $p=0.07$); however, IA group had less risk factors for neuropathy ($p<0.01$) such as alcohol consumption, diabetes mellitus, HIV and hepatitis C. 6 months after the TKR, patients had similar pain scores (NS 2.3±2, $p=0.32$) and comparable decrease of pain (NS 5.0±3.6, $p=0.31$). IA group recorded higher medication consumption (MOR 4/11, IA 5/9, FM13/39, $p=0.04$) and higher DN2 Score ($p=0.01$), mainly electric shocks (4/9), tingling (3/9) and pins & needles sensations (3/9). No differenced were found between MOR and FM for medication consumption and number of neuropathic symptoms.
**Discussion and conclusions:** According to the latest review, femoral nerve block is the gold standard after TKR. The aim of our study was to assess if early post-operative analgesic technique had an influence on the presence of chronic pain and neuropathy and we found no significant differences between MOR and FM. However, newer techniques like IA promoted by many orthopedic surgeons are yet to be deeply studied because with a limited group size in this study, we observed a higher development of neuropathic pain symptoms and a higher consumption analgesic consumption 6 months after surgery in the IA group. Additional studies are needed to confirm these results.
**Reference:**
Bauer. Curr Opin Anaesthesiol 2014;27:501-506

## 10AP04-11

### The peri-operative pain-curve of bariatric surgery

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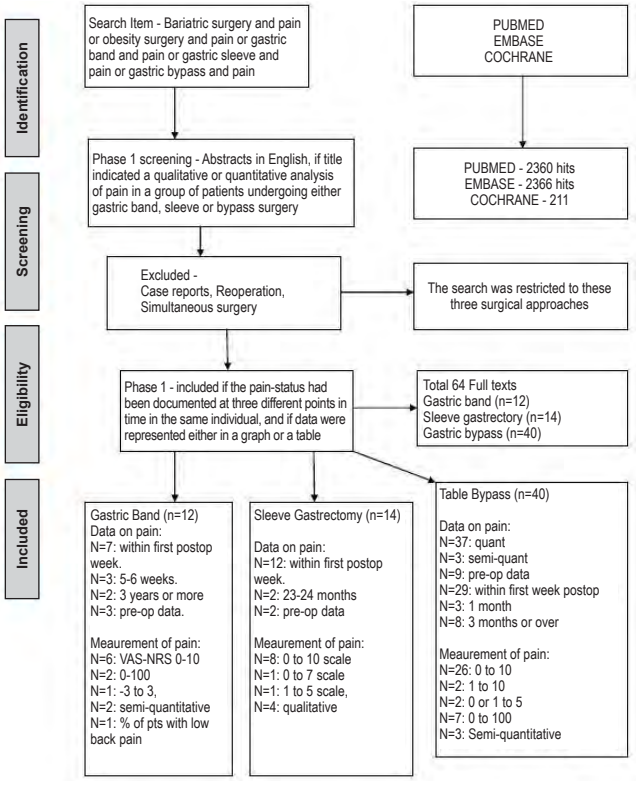
**Background and Goal of Study:** Chronic postsurgical pain (CPSP) after bariatric surgery might be an issue, requiring further attention. Therefore, a systematic review of the medical literature was performed to collect data on peri-operative pain curves of bariatric surgery (gastric band, gastric sleeve or R-en-Y gastric bypass), identifying cohorts of patients, in whom pain had been assessed prior to and after bariatric surgery.
**Materials and methods:** Pubmed-, Embase- and Cochrane databases were searched with search items *bariatric surgery and pain * obesity surgery and pain * gastric band and pain * gastric sleeve and pain * gastric bypass and pain. Full-text publications from abstracts indicating peri-operative pain measurement in case of any of above mentioned surgical methods were retrieved for further analysis. (Refer to Figure 1 for details).
**Results and discussion:** Data were lacking on the pre-operative pain status of the patients, or insufficient follow up data to draw conclusions about the postoperative pain curves were observed.
In one group, pain measurements were performed in the acute postoperative period, within the first 2 months after surgery took place. This involved mostly randomized controlled trials for medication using VAS-scoring.
In another group, data collection of pain took place in the long-term postoperative period (6 months or more after operation) in Quality of Life studies.
In earlier publications bodily pain was mentioned while in later studies the anatomic location of the pain was taken into consideration. The majority of the latter studies focused on pain of the musculoskeletal system and the abdomen.
**Conclusion(s):** Often, the pre-operative status and intermediate period regarding pain in the subject was not documented, complicating the interpretation of the postoperative pain curve. This is an important phase since it might contain the conversion point after which the pain measured can be defined as chronic instead of acute. The postoperative pain curve often lacked sufficient time points for interpretation. These data help us in designing a prospective study of peri-operative pain in bariatric surgery.




*[Fig 1. PRISMA flow chart]*

## 10AP05-1

### Evaluation of patient satisfaction on medical attention in a chronic pain unit

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**Background and Goal of Study:** The assessment in quality of medical attention it's crutial to improvement strategies in the chronic pain unit (CPI). The professionalism is a combination of knowledge but the attitudes are important too: the empathy in the doctor-patient relationship is the key to adequate follow up treatment in chronic pain. Goal of Study: Assess patient satisfaction. Investigate if patients with positive perception makes a good treatment compliance. Identify improvement areas.
**Materials and methods:** Descriptive and prospective study. A questionnarie has been designed with 11 items (care privacy, kindness, comprensión, quality securite, professionality, discharge information, clear answers, information of interventional techniques, quickly attention, coordination with other units, empathy doctor-patient) grouped in three dimensions: affability, accessibility and ability to measure the patient satisfaction (Points 1(worst) to 4(best)). The adapted questionnarie was distributed between patients that following treatment in CPI at hospital at least one month. Exclude criteria <18 years old. 66 surveys were recorded and analized.
**Results and discussion:** The average score of the overall assessment of patient satisfaction was 3.24. According to dimensions the best rated was the affability (3.91). The worst rated item was the information at the discharge time. Affability 3,91±0,29. Accesibility 3,47±0,59. Ability 3,77±0,37. The most valued ítem was empathy with a media of 3.96. From 66 patients, 93% continued treatment properly and 7% left the treatment.
**Conclusion(s):** Patient satisfaction and follow up treatment were both positive. The most positive ítems identified by the patients in the CPI were the affability, empathy and accessibility. The information at the discharge time and the interventional techniques information were the identified as improvement areas. There seems to be a relationship between patient-doctor trust and treatment compliance.

## 10AP05-2

### Depression and anxiety in chronic headache patients

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**Background and Goal of Study:** According to existing literature, the estimated anxiety-depressive disorder prevalence in chronic pain patients varies from 10 to 100% [1-3].
**Materials and methods:** 20 healthy volunteers (control group) and 40 patients with chronic headache (CH) [20 with chronic tension headache (CTH) and 20 with chronic migraine (CM)] during January-August 2015 were enrolled into a prospective randomized study. CTH and CM diagnoses were based on International Classification of Headache Disorders (ICHD-3 beta) criteria. Anxiety and depression were evaluated with the Hospital Anxiety and Depression Scale (HADS), considering depression or anxiety when the score was ≥10. The pain severity was analyzed with the Visual Analog Scale (VAS). T-test, Mann-Whitney test and Chi-square were used, with a significance level of 95% ($p<0.05$). The study was approved by the Institutional Review Board.
**Results and discussion:** The patients' mean age was31.1±7.2 in control group, 36.4±8.1 and 29.5±4.8 in CTH and CM respectively. In the control group HADS score was 3.1±0.4 and 1.7±0.5 by subscales, whereas in the CTH and CN groups this figure was significantly higher (13.8±1.5 and 16.4±2.1, $p=0.04$ - anxiety subscale; 14.2±2.0 and 12.7±1.8, $p=0.03$ - depression subscale). At the same time anxiety level was higher in the CM and depression - in the CTH. We verified that higher score of pain was associated with depression in the CTH group ($p = 0.02$) and CM ($p=0.04$). No difference was found regarding the anxiety and higher score of pain in the CTH ($p =0.34$) и CM ($p=0.12$) groups.
**Conclusion(s):** Chronic headaches are accompanied by co-existing disorders such as anxiety and depression. Depression causes significantly higher pain descriptors in CTH patients.
**References:**
1. Gnezdilov A. et al. Rus Jour of Pain 2015;1(44):122-123.
2. Samoylova N.V.Europ Jour of Pain 2011;5(1):38.
3. *Verma S, Gallagher RH. Int Rev Psychiatry 2000;12(2):103-15.*

## 10AP05-4

### Long term effects of ultrasound-guided pulsed radiofrequency therapy of the lateral femoral cutaneous nerve

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**Objectives:** In 2014 we studied the effect of ultrasound guided (US) pulsed radiofrequency (PRF) of the lateral femoral cutaneous nerve (LFCN) in patients with meralgia paresthetica (MP). US guided block with local anesthetic has a diagnostic role for MP. In 71% of the patients who had a positive diagnostic block, US guided PRF resulted in significant pain relief (GPE >50%) after 2 months. The aim of the current pilot study was to determine longterm effect in these patients.
**Methodology:** We retrospectively evaluated 38 patients with MP with regard to risk factors i.e. obesity, lumbar spine surgery, hip surgery and diabetes. 33 out of 38 patients had a positive US guided diagnostic block (>50% pain relief with 2 ml lidocaine 2%) and were qualified for US guided PRF treatment of the LFCN. The same experienced physician performed all the procedures using Hurdle's approach (1). Paresthesias in the dermatome after sensory stimulation with <0,5V confirmed correct needle position. PRF was performed at 45 V and 20ms pulse width during 2x120s at a maximal temperature of 42°C at the needle tip. Patients were evaluated at 6 weeks, 3, 6 and 12 months.
**Results:** The included patients were 45% male, aged between 27 and 85 years. Obesity was the most prevalent risk factor. More than 70% had a BMI ≥25, 21% had lumbar spine surgery , 7% was diabetic and 5% had hip surgery. At 2 months (19/33) 58% had GPE>50%. After 2 months 4 patients were lost to follow up. There was still pain relief in 41% (12/29)of patients at 3 months, 34% (10/29) at 6 months and 21% (6/29) at 12 months. 7 patients required a redo treatment resulting in a GPE > 50% at 2 months in 57% of the patients. The mean time of recurrence after successful treatment was 8,5 months. No complications were observed.
**Conclusion:** Treatment of MP with US-guided PRF of LFCN seems a promising modality with possible longterm pain relief. A redo procedure seems to have the same success rate as the first treatment. Further investigation with prospective studies are needed to confirm these observations.
**Reference:**
1. Hurdle MF Arch Phys Med Rehabil 2007 Oct;88(10):1362-4

## 10AP05-5

### Pulsed radiofrequency for chronic femoral neuralgia: a case report

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**Background:** We describe a rare case of pain associated with chronic femoral neuralgia, that has benefited from treatment with PRF (Pulsed Radiofrequency Treatment) ganglion.
**Case report:** We describe a rare case of pulsed radiofrequency treatment for pain relief associated with Chronic Femoral Neuralgia.
In September 2010, a 49 years old woman, reports pain in the anterior tigh and was subjected to endovascular surgery PFO that hesitated in complications and in a large inguinal postoperative hematoma. Furthermore she developed a chronic neuropathic pain that was treated with NSAIDs and corticosteroids. She comes to our attention in the month of June 2014 and she received temporary pain relief with femoral nerve blocks and drug therapy with pregabalin and tapentadol. Lumbar magnetic resonance imaging (MRI) revealed no acute lumbosacral lesions.
In August 2014 we performed Pulsed Radiofrequency Ganglion L2 - L3 - L4 with pulsed radiofrequency 42°-300''. After 24 hours from procedure NRS was <3. After 30 days NRS was <4. After four months NRS was 5.
In March 2015 she received the second cycle of Pulsed Radiofrequency (PRF) L2-L3-L4, 42°-300''. At 24 hours from procedure the NRS was <2. After 30 days NRS <2. After six months NRS <3.
Revalued in the month of March 2015 at our Spoke, the neuropathy, objectively, was partially regressed. The sensitivity to heat was greatly reduced. There were no signs of sensory deficits. The muscular tropism was maintained. It hesitated a minimal gait tiredness, but the lameness regressed. Even the humor of the patient had greatly benefited, since she had taken up the common life activities, without assistance.
**Discussion:** We decided to present this case because the iatrogenic neuropathic chronic inguinal pain is uncommon and it is difficult to be treated. The PRF ganglion is a procedure that allows to get good manage of pain and to return a good quality of life to the patient. We chose the PRF ganglionic because this method is indicated in the treatment of peripheral neuropathic pain from persistent hyperexcitability of nociceptors and does not exposes the target nerve structures to a detrimental temperature.
**Reference:**
Pulsed Radiofrequency for Chronic Inguinal Neuralgia - Mohamed Y. et al - Pain Physician 2015; 18E147-E155 ISSN 2150-1149
**Learning points:** For chronic groin pain, PRF ganglionic is a promising treatment modality and safe, that does not expose the patient to nerve damage.

## 10AP05-6

### Pulsed radiofrequency attenuates diabetic neuropathic pain and suppresses spinal microglia activation

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**Background and Goal of Study:** Pulsed radiofrequency (PRF) has been used to treat chronic pain for years, but its effectiveness and mechanism in treating diabetic neuropathic pain (DNP) are poorly understood. The aim of this study was to elucidate the modulation of DNP and the spinal glial activation by PRF.
**Materials and methods:** Diabetes was induced using a single intraperitoneal administration of STZ. Pulsed radiofrequency was applied to L5 and L6 dorsal roots at 42 °C for 2 min three weeks after STZ. The responses of all of the groups to thermal, mechanical and cold stimuli were measured weekly before and after this process. The expression of tumor necrosis factor-α (TNF-α), OX-42, Iba-1, phospho-p38 MAPK, interleukin-1β (IL-1β) and inducible nitric oxide synthase (iNOS), were examined in the spinal cord in order to evaluate the activation of microglia.
**Results and discussion:** STZ-diabetic rats exhibited increased mean plasma glucose concentration, decreased mean body weight and significant pain hypersensitivity compared with control rats. Three weeks after STZ treatment and before PRF application, mechanical, thermal and cold hypersensitivity occurred. Application of PRF significantly alleviated hyperglycaemia-induced mechanical, thermal and cold hypersensitivity. No differences were observed in expression levels of the microglial activity markers (OX-42, Iba-1 and phospho-p38 MAPK) between STZ-diabetic rats and control rats. However, TNF-α, IL-1β and iNOS expression levels were higher in STZ-diabetic rats compared with control rats. Following treatment PRF markers of microglial activation, including cytokines and iNOS, were downregulated in STZ-diabetic rats
**Conclusion(s):** The results of the present study indicated that PRF treatment may attenuate spinal microglial activation and alleviate DNP in STZ-diabetic rats.
**Reference:**
Neurosci Lett. 2015 Nov 17;611:88-93.
**Acknowledgements:** This work was supported, in part, by grant Nos. CMRPG8A1011, CMRPG8A1012, and CMRPG8A1013 from the Chang Gung Memorial Hospital Research, Kaohsiung, Taiwan, and by grant Nos. 101-2314-B-182-090-, 102-2314-B-182-029- and 103-2314-B-182-045-MY3 from the Taiwan National Science Council Research, Taipei, Taiwan.

## 10AP05-7

### Long-term effects of ultrasound-guided pulsed radiofrequency treatment for ilioinguinal neuralgia

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**Background and Goal of Study:** Inguinal neuralgia (IN) is a disabling medical condition, frequently involving the ilioinguinal nerve (iiN) and often challenging to treat. A recent retrospective analysis of pulsed radiofrequency therapy (PRF) of the iiN by ultrasound (US) - guided technique showed significant pain relief in 57% of IN patients after positive US-guided diagnostic block of the iiN. These data suggested PRF of the iiN is a valuable treatment for IN. In a pilot study we examined if these observations could be validated by long-term results.
**Materials and methods:** We analyzed 28 cases attending our pain center over the past 39 months with IN. All patients underwent US-guided diagnostic block of the iiN with 2mL of lidocaine 2%. Only patients with more than 50% pain relief were scheduled for US-guided PRF. The iiN was accessed about 2cm above the anterior superior iliac spine, perpendicular to its course, using a high-frequency linear ultrasound probe. A 23-gauge canula with thermocouple electrode was advanced until 50Hz sensory stimulation provoked paresthesias in the iiN dermatome at less than 0.50V to ensure correct position. PRF was performed during 240 seconds at 20ms pulse width and 45V, not exceeding 42°C at the needle tip. Global perceived effect (GPE) was evaluated at 6 weeks, 3, 6 and 12 months. GPE >50% was considered significant.
**Results and discussion:** 28 patients were included. In 23 patients IN occurred after lower abdominal surgery (82%), 5 cases were labeled idiopathic (18%). Positive diagnostic block confirmed neuralgia of the iiN in 17 cases (61% of 28 patients, i.e. 14 post-surgical and 3 idiopathic IN). At 6 weeks, 11 of 17 patients (65%) had GPE >50%. There was still pain relief in 9 of 17 patients (53%) at 3 months, in 9 of 17 patients (53%) at 6 months and in 4 of 17 patients (24%) at 12 months. Mean time of recurrence after successful initial PRF was 10 months. In 3 of 17 patients (18%) an ongoing effect of more than 2 years still exists.
**Conclusion(s):** Treatment of inguinal neuralgia with ultrasound-guided PRF of the ilioinguinal nerve seems to be a promising modality with possible long-term pain relief. These observations must be validated in larger studies, also analyzing possible difference between in-plane and out-of-plane approach.

## 10AP05-8

### Successful use pulsed radiofrequency L4-L5 dorsal root ganglions in patient with chronic stump pain

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**Background:** About 50-75% of patients suffer from stump pain resistant to pharmaceutical agents. Pulsed radiofrequency (PRF) has gained popularity in recent years for the treatment of neuropathic pain and may be considered as promising method to treat stump pain patients.
**Case report:** A 62-year-old man was consulted in our clinic 37 years after hip disarticulation due to a war accident. The left-side stump constant, sharp, burning and shock-like pain appeared immediately and was not resolved after revising surgery in 35 years. Despite the multimodal analgesic and soporific regimen included ketoprofen (200 mg per day (PD)), carbamazepine (400 mg PD), amitryptiline (25 mg PD), tramadol (300 mg PD) bromdihydrochlorphenylbenzodiazepine (2 mg PD) and zopiclone (7,5 mg PD), the patient's max/min/average pain scores (VAS) were about 10/2/7 out of 10 correspondingly. The pain affects his sleep (10/10), mood (10/10), communication (9/10), day-work (8/10), walking (10/10). His stump MRI revealed severe fibrosis but not any neuromas. Fluoroscopy guided PRF (42º, 2Hz; 20 ms; 150-200Ω, 5 min) of the left L4 and L5 dorsal root ganglions (DRG) was performed. During the following 3 months the patient reported 70% pain relief and decreasing tramadol dose up to 100 mg PD but thereafter his pain was gradually increased up to 8/3/6 VAS (max/min/average correspondingly) by 5th month after PRF procedure.
Patient increased tramadol daily dose up to 300 mg PD. Taking into consideration good clinical result after the initial PRF we performed this procedure again. By now (in 2 months after repeated PRF) the patient has reported pain relief up to 3,5/0/2,5 VAS (65/100/64 and 56/100/58% max/min/average VAS reduction in comparison with initial and before the 2nd procedure condition correspondingly). Patient's tramadol dose has been decreased up to 100 mg per 10 days. He has noticed sleep (3/10), mood (4/10), communication (0/10), day-work (5/10) and walking (0/10) improvement.
**Discussion:** By now PRF being method based on neuromodulation in DRG has not been included into chronic stump and phantom pain treatment guidelines due to lack of evidence-based data. Solitary case reports only in this field were published before. Our current clinical observation has confirmed the great potency of the method.
**Learning points:** We suggest the prospective randomized controlled trials need validating the use of PRF for chronic stump and phantom pain treatmen.

## 10AP05-10

### Ultrasonography-guided pulsed radiofrequency in comparison to fluoroscopy-guided conventional radiofrequency on medial branches supplying lumbar facet joints

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**Background:** Procedures were performed in the period from December 2014 to November 2015 by Spine Care Center in Heliopolis, Cairo, Egypt. Pulsed Radiofrequency (PRF) using Ultrasound guidance (USG) has been used on medial branches, investigating its effect in managing low back pain(LBP) caused by lumbar facet arthropathy. Conventional Radiofrequency (CRF) using Fluoroscopy guidance (FG) is another option. This study is aimed to investigate the effects of PRF and CRF , showing alternative ways to failed conservative methods and contradictory scientific evidence on minimally invasive procedures such as intra-articular steroid infiltration.
**Case report:** 60 patients above age of 50, suffering from LBP for more than 3 months with no response to conservative treatments with positive medial branch diagnostic blocks,were enrolled in the study with pain rated 77 mm or greater on the pain visual analogue scale (VAS) and 7 or greater on the Numeric rating scale ( NRS). Assessment of pain was done at baseline then weekly post procedure for 1 month then at 1-month follow-up visits for 6 months. Patients were randomly assigned, in both groups, the procedures were targeting a single medial branch supplying lumbar facet joint. Patients of the 1st group received PRF with temperature 42°C for 480 sec.,using USG. Patients of the 2nd group received CRF with temperature 80°C for 90 sec.,2 cycles, using FG .
**Discussion:** The VAS score has improved from the 2nd week by 50% in the 1st group and by 30% in the 2nd group. By the 1st month both groups showed nearly equal improvement 80% which enabled the patients to optimize physiotherapy. At the end of 6 months 30% of the 1st group needed another session compared with 10% of the 2nd group. In general, Female and obese population showed higher improvement to PRF over CRF while male and overweight patients showed better response to CRF. Patients who could not lie prone got better results with PRF using USG. These results needs further randomized controlled trials.
**References:**
1. Gharaei, et al., Korean J Pain 2014 ;27(2):133-138.
2. Schianchi PM, Anesth Pain Med. 2015 ;5(1):e21061.
3. Vikram B. Patel, et al., Anesth Pain Med. 2015 ;5(4):e29716.
**Learning points:** USG can be used in chronic spinal pain management as it has potential to increase practicability while avoiding radiation. Being obese is not a limit for using USG. CRF has better results on long term LBP management while PRF has faster results.

## 10AP05-11

### Treatment of severe ischemic pain, caused by obliterating atherosclerosis of vessels of lower extremities

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**Background and Goal of Study:** Ischemic pain is supported by structural, metabolic and functional changes in the muscles of the lower limbs. Complex conservative treatment aimed at pain level decrease precedes operations on lower limbs vessels.
The goal is to compare the effectiveness of intramuscular Prosidol (opiate analgetic) injections and epidural analgesia using Prosidol and local anesthetics in severe ischemic pain treatment.
**Materials and methods:** Within the survey 97 patients with obliterating atherosclerosis, grade III-IV were examined. They were offered two ways of analgesia:
- Intramuscular injections of Prosidol
- Epidural analgesia with local anesthetics and Prosidol
Epidural analgesia with local anesthetics (Lidocainum, Bupivacainum, Ropivacainum in standard doses) with Prosidol (up to 30 mg within 24 hours) was given to 67 patients 3-4 days before operation while 30 patients were injected intramuscularly with 20 mg Prosidol on request (up to 80 mg within 24 hours).
The patients were recorded the dynamics of the parameters of respiration, blood circulation, neuroendocrine system, clinical biochemistry of blood, indices of red and white blood before and after analgesia.
**Results and discussion:** it was found out that ischemic pain has a maximum influence on change of indicators of the peripheral and central blood circulation, acid-base status of blood, blood coagulation, inflammatory response system of the body. The neuroendocrine indicators were within the norm and did not reflect the intensity of the pain.
Intramuscular injection of Prosidol did not improve parameters of central hemodynamics while regional circulatory parameters tended to decline. Patients have not feel relief, with persistent pain, sleep disruption and disorder of appetite remained. They tossed and turned in bed, rubbed and rocked the affected leg, aggressiveness gave way to apathy and indifference.
Epidural analgesia method in the preoperative period effectively eliminated instability of the central and peripheral hemodynamics, normalized acid-base status of blood. Patients occupied a comfortable position in bed, could take care of themselves, their sleep and appetite normalized. Weak pain they characterized as aching pain.
**Conclusion:** Intensive preoperative treatment of ischemic pain syndrome, caused by obliterating atherosclerosis, using epidural analgesia with local anesthetics and Prosidol has significant advantages over intramuscular injection of Prosidol.

# Intensive Care Medicine

## 11AP01-1

### Efficacy of presepsin for identification of patients with microbiologically documented sepsis

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**Background and Goal of Study:** The criteria for sepsis recognition include the presence of systemic inflammatory response syndrome (SIRS) caused by infection which can be documented or highly suspected when the treatment of the patient is initiated. However, it is very difficult to differentiate non-infectious SIRS from sepsis in many critically ill patients in order to timely begin proper anti-infection treatment. Pathogen identification from cultures and antimicrobial susceptibility testing take time, and there is a need for identification of biomarker that could early differentiate sepsis from non-infectious SIRS.
The aim of our study was to determine whether levels of biomarkers that are mostly used for assessment of sepsis, measured within the first 24 hours of SIRS development, could be used to determine the presence of microbiologically documented infection.
**Materials and methods:** 100 patients with suspected sepsis were included in our study. To evaluate the diagnostic utility of the biomarkers, patients were classified into two groups: patients with microbiologically documented sepsis by positive cultures (blood cultures, urine, cerebrospinal fluid, wounds, respiratory secretions, or other body fluids that may be the source of infection) and patients with SIRS and suspected infection without microbiologically positive findings.
Procalcitonin (PCT), C-reactive protein (CRP), and presepsin levels, as well leukocyte count were determined within 24 when sepsis was suspected.
Differences between groups of patients were assessed by Mann-Whitney U test. All P-values were two-sided and statistical significance was set at a value of 0.01.
**Results and discussion:** Levels of presepsin were significantly higher in group of patients with documented infection in comparison to patients without documentation of infection (3173.33± 4435.62 vs. 1607.± 2087.94, $p<0.01$), while levels of PCT (36.03 ±73.41 vs. 14.31± 25.52, $p=0.09$), CRP (239.6±382.35 vs. 190.15 ± 116.92, $p=0.75$) and leukocyte count (14.65 ± 7.21 vs. 15.77±9.08, $p=0.9$) did not differ significantly.
**Conclusion(s):** Our results suggest that presepsin may be a helpful biomarker for identification of patients with infectious SIRS, documented by positive microbiological findings from cultures, with higher levels of this biomarker in patients with microbiologically documented sepsis.

## 11AP01-2

### Clinical use of presepsin, procalcitonin and CRP in diagnosis and prognosis of sepsis

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**Background and Goal of Study:** The clinical use of presepsin in separating sepsis and other causes of systemic inflammatory response syndrome (SIRS) was studied and compared with procalcitonin (PCT) and C-Reactive Protein (CRP) in a prospective observational study.
**Materials and methods:** After Ethical approval, 80 consecutive suspected sepsis patients were enrolled into the study for six months in a mixed ICU. Point of care methods - Presepsin (PATHFAST, Medience Corporation), Procalcitonin (BRAHMS) and CRP levels (quantitative test, nephelometry, Beckman Coulter) were measured in patients with suspected systemic bacterial infection. The ICU sepsis protocole also included leucocyte count, other inflammation markers and site cultures, as indicated by clinical judgement. When it was possible, Presepsin levels were reassesed in evolution at 72-96 hours.
**Results and discussion:** The cutoff value of presepsin for discrimination sepsis and non-infective SIRS was chosen to be 400 pg/ml (deducted from local experience). For survivors (N = 44) and non-survivors (N = 36), results showed 1171.38 ± 260.25 and respectively 1285.38 ± 283.27 pg/ml ($p = 0.064$). The late (72-96 h) Presepsin determinations showed a strong difference between survivors and non-survivors. Presepsin levels in patients with Gram-positive, Gram-negative and fungal infections were found at 1498.4 ±591.19, 1274.75 ±505.40 and respectively 1562.5 ±479.18 pg/ml. There has also been 60/80 positive cultures (the majority of them being from peritoneal fluid, tracheal secretions, urine).
The sensitivity of cultures was 75%, while that for presepsin was 85.7%.
**Conclusion(s):** Presepsin is useful for the diagnosis of sepsis, superior to conventional markers and blood culture. Moreover, the serial determination of presepsin might be useful in predicting the evolution of septic patients.
**Reference:**
Xin Zhang, Dan Liu, You-Ning Liu, Rui Wang and Li-Xin Xie, The accuracy of presepsin (sCD14-ST) for the diagnosis of sepsis in adults: a meta-analysis. Critical Care (2015) 19:323

## 11AP01-4

### Matrix metalloproteinase-9 and tissue inhibitor of matrix metalloproteinase-1 as diagnostic and prognostic biomarkers of sepsis in major abdominal surgery

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**Background and Goal of Study:** Matrix metalloproteinase-9 (MMP-9) and tissue inhibitor of matrix metalloproteinase-1 (TIMP-1) are potential biomarkers of sepsis, possibly associated with inflammation, oxidative stress and sepsis-associated kidney and liver injury. We aimed to investigate, for the first time, MMP-9 and TIMP-1 as diagnostic and prognostic biomarkers of sepsis in major abdominal surgery patients as well as their association with inflammation, oxidative stress and sepsis-associated kidney and liver injury.
**Materials and methods:** This prospective, observational study included 153 major abdominal surgery patients divided into sepsis group (n = 53), operated controls (n = 50) and not-operated controls (n = 50), matched by age, gender, comorbidities and type of surgery. The study was approved by institutional ethical committee. Blood and urine samples from patients with sepsis were collected daily during 96 h following admission to intensive care unit (ICU) and once from controls. We measured levels of MMP-9, TIMP-1 and biomarkers of inflammation, oxidative stress, kidney and liver injury. MMP-9/TIMP-1 ratios and disease severity scores were calculated.
**Results and discussion:** MMP-9 levels and MMP-9/TIMP-1 ratios were lower and TIMP-1 levels higher in patients with sepsis compared to control groups and remained similar over 96 h. MMP-9, TIMP-1 and MMP-9/TIMP-1 ratio correlated with disease severity scores and biomarkers of inflammation, oxidative stress, kidney and liver injury. The areas under the receiver operator characteristic curve for diagnosis of sepsis on admission to ICU were 0.940 (0.889 - 0.991) and 0.854 (0.778 - 0.930) for TIMP-1 and 0.924 (0.873 - 0.975) and 0.788 (0.697 - 0.879) for MMP-9/TIMP-1 ratio when sepsis group was contrasted to not-operated and operated controls, respectively. Lower MMP-9 and MMP-9/TIMP-1 ratio and higher TIMP-1 levels were associated with shorter survival (Log rank: $p_{MMP-9} = 0{,}002$, $p_{TIMP-1} < 0{,}001$, $p_{MMP-9/TIMP-1\ ratio} < 0{,}001$).
**Conclusion(s):** MMP-9, TIMP-1 and MMP-9/TIMP ratio could serve as potential diagnostic and prognostic biomarkers of sepsis in major abdominal surgery patients. These biomarkers were associated with inflammation, oxidative stress and sepsis-associated kidney and liver injury.

## 11AP01-5

### Relationship between Procalcitonin levels and positivity of microbiological samples in intra-abdominal infection

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**Background and Goal of Study:** Assessment of the association between PCT levels and positivity of microbiological samples in intra-abdominal infection (IAI), so that high levels of PCT can serve as a guide for microbiological sampling.
**Material and methods:** Retrospective study using data available from patients diagnosed with IAI, with a stay over 48 hours in an Intensive Care Unit in 2014. The variables studied were PCT and microbiological samples at the time of admission and during the stay, length of stay in the unit, microbiological samples obtained at admission and during the stay, and mortality. A descriptive study of the variables was performed. Student's t test was conducted to evaluate the association between PCT levels and microbiological samples.
**Results:** Data from 35 patients were analyzed. The mean age in the sample is 71.31; 95% CI [66.9-75.6]. The average stay in the ICU is 4.91 days 95% [3-6.83].
The most common diagnosis was bowel perforation in colon cancer patients. Microbiological samples of peritoneal fluid were obtained in 16 patients at admission. 50% were positive, being *E. coli* the most common pathogen.
The mean level of PCT at admission is 8.4; 95% CI [13.5-18.6]. During the stay 12 more samples were obtained, including drainage, blood, bronchial, urine and wound cultures. The average level of PCT, when the sample was positive during stay, is 17.7, 95% CI [0-35.7]. The microbiological results of the samples during the stay indicated that *Enterococcus faecalis* is the most common pathogen. *Pseudomonas aeruginosa* and *Candida albicans* also appear. Student's t test for PCT and microbiological samples t = 0.66 ($p < 0.05$) is not statistically significant. Student's t test for PCT and the day in which the sample is positive t = -0.75 ($p < 0.05$) is not statistically significant.
Mortality at 28 days was 14.29%.
**Conclusions:** No association was found between PCT levels and positive microbiological samples, so PCT should not be used as a guide for sample collection.
50% of the cultures taken at admission were positive, therefore sampling of peritoneal fluid in patients admitted with IAI is highly recommended.
The microbiological flora growing in samples obtained at admission varies from the flora in samples collected during the stay.
**References:**
1. Guirao X, Arias J, Badia JM, et al. Cir Esp 2010;87: 63-81.
2. Maseda E, Suárez-de-la-Rica A, Anillo V, et al. Crit Care 2015; 30: 537-542.

## 11AP01-6

### Connection between serum lactate levels and postoperative outcomes in patients undergoing cytoreductive surgery associated with hyperthermic intraperitoneal chemotherapy

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**Background and Goal of Study:** Serum lactate levels are useful as markers of tissue hypoperfusion in various situations such as shock, post-resuscitation period, prognostic evaluation after resuscitation in sepsis and as a marker for postoperative surgical complications. Cytoreductive surgery associated with hyperthermic intraperitoneal chemotherapy (HIPEC) is related to important metabolic disorders, including increases in serum lactate levels. The goal of our study was to evaluate if elevated serum lactate levels during the first 24h is associated to relevant parameters of postoperative recovery.
**Materials and methods:** Retrospective cohort study of patients undergoing HIPEC in 2014, who were divided into two groups: Group I (GI): patients with postoperative lactate levels less than 1.7mmol/L in the first 24h and Group II (GII): patients with lactate levels greater than 1.7mmol/L. Demographic characteristics of patients, surgical data, intraoperative anaesthetic management, postoperative parameters, time of intubation, resuscitation days, complications and hospital stay were assessed.
**Results and discussion:** GII received greater intraoperative infusion of crystalloid fluids (6585±1341 vs. 5517±1641 GI; p=0.03) and transfusion therapy (44% vs. 8%; p=0.004). ICU stay was longer in GII (3.6±1.4 vs. 2.4±0.8 days in GI, p=0.001). The duration of postoperative intubation was longer in GII (29±22 vs. 15±7.5 h in GI; p=0.009). GII also showed a greater complication rate than GI (78% vs. 53%, p=0.09). 28% of patients in GII had a extended stay at ICU (>4 days) compared to 4% in GI (p= 0.02). The area under the ROC curve for lactate levels at 24h was 0.77 (IC 95% 0.54-0.89; p=0.02). A threshold value at 24h of 1.75 mmol/L would discriminate patients at risk of prolonged ICU stay with a sensitivity of 83% and a specificity of 71%.
**Conclusion(s):** Cytoreductive surgery associated with (HIPEC) is related to important postoperative morbidity. Elevated serum lactate levels during the first 24h are associated with criteria of greater surgical aggressiveness and predict the occurrence of postoperative complications and prolonged stay in ICU.
**Reference:**
Yu WenKui, et al. Restricted peri-operative fluid administration adjusted by serum lactate level improved outcome after major elective surgery for gastrointestinal malignancy.Surgery 2010;147:542-52.)

## 11AP01-8

### The correlation between low coagulation factor XIII activity and anastomic leakage in patients who undergo bowel resection

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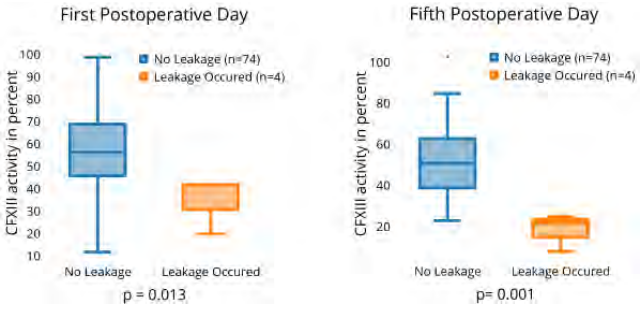
**Background and Goal of Study:** Anastomic leakages (AL) are rare but severe complications of bowel resections. AL occurs in 5% to 10% of bowel resections; its causes are mostly unknown.[1,2]
The authors tested the thesis whether or not there is a correlation between low coagulation factor XIII (CFXIII) activity and AL in a prospective observational study.
**Methods:** Over a period of 6 months, CFXIII activity of patients who were planned to undergo bowel resection was monitored. CFXIII activity was determined at three stages: (1) directly before the surgery, (2) on the first postoperative (PO) day and (3) on the fifth PO day. After ten days patients were divided into two groups: (a) a "no-leakage"-group and (b) a "leakage-occurred" group. The medians of the two groups were then compared using the Mann-Whitney-U-Test.
**Results and discussion:** Of the 78 patients who were included in the study 4 showed signs of AL and had to undergo surgical revision. In the "leakage-occurred"-group CFXIII activity was significantly lower than in the "no-leakage"-group on the first (median 41% vs 56%, p=0.013) and fifth (median 21% vs 50%, p=0.001) PO day, as shown in figure 1.




*[Fig. 1: CFXIII activity on first and fifth PO day]*

Also, the preoperative CFXIII activity was lower in the "leakage-occurred"-group but our study does not show a statistically significant correlation (median 60% vs 69%, p= 0.213).
**Conclusions:** AL typically occurs around the fifth PO day. Since CFXIII activity is significantly lower in patients who later developed AL on the first PO day already, we draw the conclusion that there is at least a predictive component in CFXIII activity.
It is also possible that low CFXIII activity is a reason for AL. We plan to conduct a further study to determine whether or not patients benefit from CFXIII substitution prior to bowel resections.
**References:**
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2. Fujita I, Kiyama T, Mizutani T, et al. Factor XIII Therapy of Anastomotic Leak, and Circulation Growth Factors. Journal of Nippon Medical School 2006;73:18-23.

## 11AP01-10

### The protective effects of endocannabinoid system on TNBS-induced colitis

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**Background and Goal of Study:** Endocannabinoid system (ECS) has been demonstrated to play an important role in a variety of physiological and pathological processes, including pain perception and inflammatory responses. An emerging body of data indicated that activation of ECS possess potential therapeutic effects on inflammation bowel diseases (IBDs). To date, the impact of ECS on IBDs concomitant other organ injury has not been investigated clearly. The purpose of this study was to explore the protection effects of ECS activation by using URB597, a known selective fatty acid amide hydrolase inhibitor, on colitis and inflammation-relevant blood-brain-barrier (BBB) disruption.
**Materials and methods:** An intrarectal injection of trinitrobenzene sulfonic acid (TNBS) enema was applied to establish acute colitis murine model, while mice in control group were injected the vehicle of 50% ethanol solution. URB597 (2mg/kg, s.c., b.i.d) administration was applied before or after the colitis induction. Macroscopic signs of colon inflammation were evaluated on the 1st/3rd/7th day after colitis induction and 7 days survival rate was recorded. Blood-brain-barrier integrity was assessed by using a dye tracer method, and cognitive functions were examined in fear-conditioning test.
**Results and discussion:** Colitis was induced successfully, as macroscopic score in model group was significantly higher than the control group (*$^{*}P<0.05$*). URB597 treatment, including both pre- and post-administration, could improve colon damage and decrease macroscopical changes (*$^{\#}P<0.05$*). Survival rate in colitis group with URB597 post-treatment was also promoted (*$^{\#}P<0.05$*). Colitis-induced inflammation results the increase of blood-brain-barrier permeability on 1st day (*$^{*}P<0.05$*), while URB597 administration could significantly ameliorate the integrity of blood-brain-barrier (*$^{\#}P<0.05$*). Significantly change of cognitive behaviors of mice in colitis group was not observed in the study, and URB597 couldn't be proved to involve in the improvement of cognitive functions (*$P>0.05$*).
**Conclusion(s):** In this study, the activation of endocannabinoid signal pathway was demonstrated to effectively control colitis symptom. Our experiment results indicate that URB597 (a FAAH inhibitor) could significantly improve TNBS-induced acute colitis, promote 7 days survival rate, and protect BBB integrity. URB597 might become a potential pharmaceutical in inflammatory therapy.

## 11AP01-11

### Black esophagus in intensive care unit: a rare and intriguing entity

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**Background:** The "black esophagus" or acute necrotizing esophagitis is rare, multifactorial and frequently associated with hypoperfusion or ischemic states, like hypovolemic or septic shock[1]. It is characterized by upper gastrointestinal bleeding and typical endoscopic pattern with circumferential black colouring of distal mucosa with proximal extension[1]. It may complicate with perforation, esophageal stricture and infection, and has a high mortality rate. Its treatment is supportive and the prognosis depends on the underlying pathology.
**Case report:** Male, 76 years-old, with arterial hypertension, gout, liver and kidney disease. Admitted in the Burn Unit with thermal burn of 2nd and 3rd degree (40% of total body burn area). He presented with hemodynamic instability and signs of hypoperfusion. Consequently, he was submitted to major fluid resuscitation and noradrenergic support. Two early episodes of hematemesis led to diagnostic endoscopy, which revealed multiple necrotic areas, more exuberant, confluent and circumferential in middle and lower esophagus. Support therapy was started with IV pantoprazole for 3 days, followed by 40mg oral bid, enteral feeding and triple prokinetic therapy. At day 16, new endoscopy due to gastric stasis showed: esophagus with superficial ulcer areas in the distal third, less invasive than previously.
**Discussion:** The incidence of black esophagus is 0.01 to 0.2% in endoscopic series, especially affecting males (88.5%). Its differential diagnosis includes malignant melanoma, pseudomelanocytosis, melanocytosis or acanthosis nigricans. In this patient, early hypoperfusion was critical to low esophageal blood flow, especially distally. Patient age and background were deleterious, as the immunosuppressive state of burn patient. Fluid resuscitation and protective medication were positive measures. Possible complications as esophageal rupture (7%) or stricture (10%), infection or mediastinal abscess[1] were excluded by endoscopy and thoracic CT scan and mortality will depend on underlying pathology and its evolution.
**Reference:**
1. Gurvits G., *World J Gastroenterol. 2010 Jul 14*; 16(26): 3219-3225
**Learning points:** Black esophagus is a clinical condition with serious complications and high mortality (32%)[1], therefore it's important to be alert for this entity in the ICU. Attention on possible signs of any complication as well as institution of supportive therapy might be useful to reduce the mortality rate of these critical patients.

## 11AP02-1

### Effects of daptomycin treatment on TNF-α-stimulated human endothelial cells

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**Background and Goal of Study:** Daptomycin is a lipopeptide antibiotic used in the treatment of systemic and life-threatening infections caused by Gram-positive organisms.It has a particular mechanism of action, disrupting multiple aspects of bacterial cell membrane function, which makes it useful in treating infections caused by multiple drug-resistant bacteria. In addition to its antibacterial properties, there is also some evidence indicating that it could also exhibit anti-inflammatory and immunomodulatory effects beneficial in the treatment of infections. Using an *in vitro* approach, our study pretends to explore how daptomycin administration modulates endothelial cell response to TNF-α stimulation.
**Materials and methods:** Primary human endothelial cells (HUVECs) were stimulated with TNF-α (15 μg/mL) for 18h and subsequently treated with daptomycin (0: control group, 15, 25, 50 or 100 μg/mL). The tested doses are within the therapeutic plasmatic concentrations for daptomycin.Samples were taken 24 h after daptomycin treatment to measure cell necrosis (lactate dehydrogenase release) and levels of pro-inflammatory interleukin (IL-6), the chemokine monocyte chemoattractant protein 1 (MCP-1) and the adhesion molecule E-selectin. After the normality of data were assessed by Kolmogorov-Smirnov test, statistical analysis was performed with ANOVA followed by *post hoc* test when appropriate using statistical software Prism 5 (GraphPad).A $p<0.05$ was considered statistically significant.
**Results and discussion:** All tested doses of daptomycin protected against TNF-α -induced endothelial cell necrosis (all $p<0.05$). A dose of 25 μg/mL or greater reduced levels of IL-6 as well as levels of MCP-1 and E-selectin (all $p<0.05$). Treatment of HUVECs with the 15 μg/mL dose did not show effects on the levels of the analyzed mediators (all $p\geq0.05$). Maximum reduction of IL-6, MCP-1 and E-selectin levels was observed in the 50 μg/mL group, without differences respect to results observed with 100 μg/mL group (all $p\geq0.05$).
**Conclusion(s):** Daptomycin has shown protective effects against human endothelial cell death induced by TNF-α. Our results also suggest that this effect might be related to an attenuation of inflammatory, chemotactic and cell adhesion mechanisms. Future studies might explore the potential role of daptomycin in modulating molecular mechanisms involved in inflammatory processes, expanding its beneficial role besides its known antimicrobial effect.

## 11AP02-2

### The impact of PLXNC1 on host defense in sepsis

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**Background and Goal of Study:** Sepsis is a large-scale health care problem with a incidence of up to 300,000 cases/year in Germany (1). Recently the neuronal guidance receptor Plexin C1 (PLXNC1) has shown play a significant role during zymosan A -induced peritonitis (2) and Ventilator-induced lung injury (3). Therefore we hypothesize that, PLXNC1 might have an impact on the severity and outcome of sepsis.
**Materials and methods:** All Animal experiments were approved by the responsible authorities. C57Bl/6 Wildtype (WT) and *PLXNC1*$^{-/-}$ mice were used in a Model of Cecal ligation and Puncture (CLP).
**Results and discussion:** 24 h after CLP, *PLXNC1*$^{-/-}$ mice showed reduced levels of cells, myeloperoxidase (MPO) activity, protein content and keratinocyte chemoattractant (KC) concentration in the peritoneal lavage [Cell count 3,44±0,25 vs. 2,57±0,26 (x$10^6$/ml), Protein 2,03±0,3 vs. 1,3±0,1 (mg/ml), MPO 0,66±0,08 vs. 4,23±0,07 (OD 405 nm), KC 1093±255 vs. 518±112 (pg/ml), n=6, $p<0,05$]. Tissue infiltration of PMN was reduced in *PLXNC1*$^{-/-}$ mice as well. Furthermore, PLXNC1$^{-/-}$ mice revealed a higher bacterial load in the peritoneal cavity and blood 24 h after CLP [CFU Peritoneallavage 1,99±0,87 vs. 6,08±2,36 (x$10^6$/ml)]. This was associated with reduced survival rates in PLXNC1$^{-/-}$ mice 96h following CLP.
**Conclusion:** Our experiments show that deficiency of PLXNC1 plays a pivotal role during experimental sepsis. On one hand the absence of PLXNC1 reduces inflammatory response but on the other hand compromise bacterial host defense with fatal outcome. This suggests that PLXNC1 plays an important role during sepsis.
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1. Reinhart K, Brunkhorst FM, Bone HG, et al. Prevention, diagnosis, therapy and follow-up care of sepsis: 1st revision of S-2k guidelines of the German Sepsis Society (Deutsche Sepsis-Gesellschaft e.V. (DSG)) and the German Interdisciplinary Association of Intensive Care and Emergency Medicine (Deutsche Interdisziplinare Vereinigung fur Intensiv- und Notfallmedizin (DIVI)). German medical science : GMS e-journal 2010;8:Doc14.
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## 11AP02-3

### Nitric oxide and endocan serum levels in sepsis

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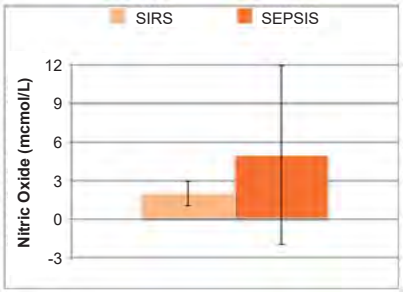
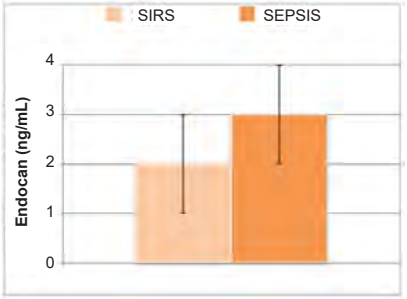
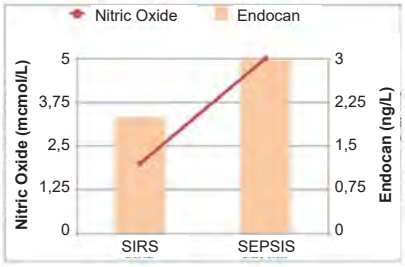
**Background and Goal of Study:** Nitric oxide (NO) is a vasoactive agent. Endocan is a newly recognized biomarker of sepsis. The aim of this study was to assess NO and endocan levels during SIRS and sepsis.
**Materials and methods:** We enrolled 13 severe sepsis patients and 7 SIRS patients (1). Endocan and NO serum levels were measured in all patients within 12 hours of diagnosis. NO serum levels were quantified by Sievers NOAnalisys. Endocan serum levels were quantified by ELISA.
**Results:** NO serum levels increases by 60 % in patients with sepsis than patients with sirs, serum Endocan increases of 33 % in patients with sepsis than patients with sirs ($p<0,05$)



*[Nitric Oxide serum levels in SIRS and sepsis]*



*[Endocan serum levels in SIRS and sepsis]*




*[NO and Endocan levels in SIRS and sepsis]*

**Conclusion(s):** Serum endocan and NO levels in sepsis are higher than in SIRS patients. However, further prospective study concerning the causative relationship between endocan and NO release is needed.

**Reference:**

1. "American College of Chest Physicians/Society of Critical Care Medicine Consensus Conference: definitions for sepsis and organ failure and guidelines for the use of innovative therapies in sepsis". Crit. Care Med. 20 (6): 864-74.

## 11AP02-4

### Early detection of critical kidney and splenic hypoxia during septic shock using photoacoustic imaging (PAI)

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**Background and Goal of Study:** Despite extensive research sepsis still remains a devastating disease with poor outcome determined by multi-organ failure that is mainly caused by organ misperfusion. Thus direct tracking of organ oxygenation may be of benefit. Photoacoustic imaging (PAI), a combination of spectroscopy and ultra sound imaging, may be a promising approach. The present study aims to demonstrate the utility of PAI in sepsis management.

**Materials and methods:** The study was approved by the Regierungspräsidium Hessen (#FK/1037). FOX1/nu mice were injected 10mg/kg LPS i.v. every 5 min. for 3 times. PAI (Vevo LAZR, Visual Sonics FujiFilm) measurements were performed real-time. For serum biomarker kinetics, FOX1/nu and immunocompetent Balb/c (each n=8) mice were injected i.v. LPS at 10mg/kg or NaCl 100µl for controls. Final blood sampling was performed 5, 10, 20min, 5,5h and 18h following i.v. application. Serum IL6 and TNFα levels were detected by ELISA (Infinite 200, Tecan). Data: mean±SEM; tests: unpaired t-test, ANOVA, Sidak's multiple comparisons test; significance: $p<0.05$.

**Results and discussion:** We compared PAI data to plasma cytokine levels. Both, FOX1/nu and Balb/c mice reached maximum IL6 levels after 5,5h after LPS injection (6459±56,3 pg/ml vs. 65,9±16,1 pg/ml, $p<0.001$ and1188±16,9 pg/ml vs. 8,6±0,5 pg/ml, $p<0.001$). Similar results were observed for TNFα levels, where FOX1/nu mice (164,3±8,5 pg/ml vs. 59,2±4,3 pg/ml, $p<0.001$) and Balb/c mice (827,5±101,9 pg/ml vs. 35,9±3,9 pg/ml, $p<0.001$) had also the highest levels at 5,5h. In the PAI experiments, a significant decrease in renal (from 71,1±0,9% to 34,4±1,3%, $p<0.001$) and spleen (from 69,5±0,9% to 34,9±2,7%, $p<0.001$) oxygenation resulted immediately at LPS injection. Comparing baseline with values at the end of the experiment, renal oxygenation remained significantly decreased whereas this was not the case in controls (75,35±0,29% vs. 66,78±0,27%;
$p<0.001$ and vs. 73,73±0,32%). The changes in spleen oxygenation were even more pronounced when comparing baseline to end of experiment measurements (77,66 ± 0,30% vs. 62,91 ± 0,48%, $p<0.001$).

**Conclusions:** Clinically used routine biomarkers such as IL6 and TNFα need at least 6 hours after infection until an increase may be detected reliably. Organ oxygenation measurements via PAI might be a powerful alternative to more rapidly detect changes in oxygenation during septic shock and thereby reliably predicting risks for organ failure risks.

## 11AP02-5

### Metformin induced lactic acidosis - a case report

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Metformin is a biguanid and because of its effects in decreasing the production of glucose in liver and in increasing the sensitivity of insulin in peripheral tissues like adipose tissue and skeletal muscle, it is used in metabolic syndrome and type 2 diabetes mellitus in which insulin resistance is especially pronounced. The most important side effect of metformin is lactic acidosis . Lactic acidosis is the most frequent cause of hospitalized patients with metabolic acidosis. As a result, it can cause cardiopulmonary arrest. Systemic hypoxemia, sepsis, dehydration, old age and overdose cases increases in these complications.

60 year-old female patient applying because of the widespread bodily pain and general condition disorder to the emergency service. Results of examinations and laboratory; has been identified in patients with severe renal insufficiency and leukocytosis and invested with the diagnosis of sepsis was sedated in intensive care unit.

As a result, lactic acidosis is described as a fatal complication of metformin intoxication. Mainstays of treatment are early diagnosis, correction of lactic acidosis, cardiovascular support, and normalization of the body temperature We also aimed to discuss the effects of lactic acidosis due to use of Metformin

**References:**

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**Keywords:** Metformin, Lactic acidosis,Type 2 Diabetes Mellitus, Obesity and Insulin Resistance

## 11AP02-6

### TIMP-2 and IGFBP7 as early biomarkers of acute kidney injury after orthotopic liver transplantation

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**Background and Goal of Study:** Acute kidney injury (AKI) is a frequent complication after orthotopic liver transplantation (OLT) and it`s early detection is of crucial importance for an appropriate management. Since the traditional kidney function parameters like serum-creatinine (s-Cr) have severe limitations concerning early detection of AKI, novel biomarkers such as TIMP-2 and IGFBP7, have been studied and shown to be superior in previous studies in critically ill patients. The aim of our study was to evaluate the predictive value of these novel biomarkers during the early perioperative period after human OLT.

**Materials and methods:** Paired urine and blood samples from patients undergoing OLT were collected at five different time points (TP): after induction of anesthesia (TP0), end of surgery (TP1) and at day 1 and 2 after OLT (TP2, TP3). The incidence of perioperative AKI was assessed according to the Acute Kidney Injury Network (AKIN) criteria. The detection of urinary TIMP-2 and IGFBP7 was performed using the NephroCheck (NC) test (Astute140® Meter), an ELISA based assay, which defines the risk score for AKI. Data are presented as mean ± standard deviation (SD).

**Results and discussion:** Forty liver transplant recipients were enrolled in this study. Thirteen (32%) patients developed AKI stage 2 or 3 within 48 h post OLT and 6 (15%) patients were supported with renal replacement therapy. There was no significant difference in the receiver operating characteristics curve analysis at TP0 and TP1 between the NC test and s-Cr in regard of development of AKI 2 or 3 within the first 48 hours post OLT. S-Cr at TP2 performed even better (AUC 0.83; CI 0.68-0.93; $p=0.0001$) than the NC test (AUC 0.51; CI 0.34-0.67; $p=0.26$). Only on day 2, both, s-Cr (AUC 0.90; CI 0.76-0.97; $p=0.0001$) and NC (AUC 0.70; CI 0.54-0.84; $p=0.02$) predicted AKI 2 and 3.

**Conclusion(s):** TIMP-2 and IGFBP7 are not superior to the traditional kidney function parameters in predicting development of perioperative AKI II and III in the clinical setting of human OLT.

## 11AP02-10

### Drug-induced HPA axis alterations during acute critical illness: a multivariable association study

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**Background and Goal of Study:** Critical illness is hallmarked by low plasma ACTH in the face of high plasma cortisol. We hypothesized that frequently used drugs could play a role by affecting the hypothalamus-pituitary-adrenal axis.
**Materials and methods:** For 156 medical-surgical critically ill patients, plasma concentrations of ACTH and total and free cortisol were quantified upon ICU admission and throughout the first 3 ICU days. The independent associations between drugs administered 24h prior to ICU-admission and plasma ACTH and cortisol concentrations upon admission were quantified with use of multivariable linear regression analyses.
**Results and discussion:** Upon ICU admission, compared with matched healthy subjects, patients revealed low mean±SEM plasma ACTH concentrations (11.8±2.7 pg/ml vs. 41.0±7.2 pg/ml, $P<0.0001$) in the face of unaltered total plasma cortisol (12.2±1.1 $\mu$g/dl vs. 10.9±0.6 $\mu$g/dl, $P=0.3$) and elevated free plasma cortisol concentrations (1.5±0.2 $\mu$g/dl vs. 0.2±0.1 $\mu$g/dl, $P=0.04$). Plasma ACTH concentrations remained low ($P<0.001$) until day 3 whereas plasma (free)cortisol concentrations steeply increased and remained high ($P<0.001$). No independent correlations with plasma ACTH were found for any of the tested drugs. In contrast, the total admission plasma cortisol concentration was independently and negatively associated with the cumulative opioid dose [a decrease of 0.31 (95% CI -0.50 to -0.13 $\mu$g/dl) in total plasma cortisol for every 10 mg morphine-equivalent given; $P=0.001$], the cumulative propofol dose [a decrease of 0.26 (95% CI -0.49 to -0.03) $\mu$g/dl in total plasma cortisol for every 100 mg of propofol given; $P=0.02$] and the use of etomidate [a decrease of 2.38 (95% CI -4.57 to -0.18) $\mu$g/dl in total plasma cortisol when given; $P=0.03$], and positively with the cumulative dobutamine dose [an increase of 0.68 (95% CI 0.29 to 1.06) $\mu$g/dl plasma cortisol for every 4200 $\mu$g given (equal to 1 $\mu g\ kg^{-1}\ min^{-1}$ for a 70 kg individual for one hour); $P=0.0007$].
**Conclusion(s):** Besides the known suppressive effect of etomidate, also opioids and propofol may suppress and dobutamine increase plasma cortisol in a dose-dependent manner. The observed independent associations suggest drug effects not mediated centrally via ACTH, but rather peripherally by a direct or indirect action on the adrenal cortex.

## 11AP02-11

### Comparison between hemoglobin level and lactate blood level as predictor of hemotransfusion trigger

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**Aim:** To investigate the role of blood lactate level as an important indicator for indicating the starting of hemotransfusion. In this regard the lactate level was compared with hemoglobin levels.
Therefore this study aimed to evaluate extent of considering the blood lactate level in decision-making for initiation of hemotransfusion and compare the improvement of the clinical outcomes with the results when hemoglobin is used as hemotransfusion trigger.
**Study design:** Prospective observational.
**Methods:** In this prospective observing study were enrolled 59 patients undergoing hemotransfusion. Patients with APACHE score of above 24 were excluded from the study. Each patient at the time of admission was continuously monitored for vital parameters (i.e. systolic blood pressure, heart rate, etc) as well as for blood lactate levels and hemoglobin.
Blood lactate and hemoglobin levels were measured also at 2 h after the first hemotransfusion and at 24h from the admission independently if the patient was hemotransfused again or not.
The patients were first grouped in 2 groups according to the hemoglobin levels having as threshold the Hb level of 8gr/dl and then re-grouped again according to the blood lactate level having as threshold the blood lactate level of 2.4mol/L.
**Results:** When patients are grouped based on hemoglobin levels ($<$or $\geq$ 8gr/dl) at the time of admission it was shown that there was no significant difference between the two groups for Hb levels at 2 h and 24 h after the initiation of the hemotransfusion.
On the contrary, when patients are grouped based on blood lactate levels ($<$or $\geq$ 2,4 mmol/L) the significant difference between the two groups for blood lactate level values at the time of admission continued to remain significant even at 2 h and 24 h after the initiation of the hemotransfusion.
**Conclusions:** Patients with high blood lactate level at admission required more blood packs transfused and had a poorer morbidity and mortality compared with patients with lower blood lactate level value. A negative correlation between Hb and blood lactate level at the time of admission was demonstrated. It was also shown that the progressive increase of Hb values was not associated with a progressive decrease of blood lactate levels. It was concluded that blood lactate level is a better indicator of patients in need for hemotransfusion.

## 11AP04-1

### Use of intensive care resources by patients who have taken overdoses

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**Background and Goal of Study:** Critical care is required in the management of intentional overdose due to the potential for significant harm. Management is multi-faceted and preventing further overdose is complex [1, 2]. Our aim was to determine the use of intensive care (ICU) resources by patients who have taken overdoses.
**Materials and methods:** We conducted a retrospective analysis of admissions to our ICU for overdose over three years (10/2012-09/2015), assessing incidence of admission, readmissions and discharge. A survey of anaesthetic trainees in London assessed frequency of overdose management, repeat presentations and known previous history of overdose. We also assessed availability of psychiatric review and discharge from ICU.
**Results and discussion:** There were 85 admissions to ICU for overdose over three years (4.2% of all admissions). Substances included antidepressants, sedatives and alcohol (24, 19 and 7 patients respectively). In 24 patients the causative agent was unknown. Length of stay ranged from 1 to 51 days, with an average of 4 days. The total number of bed days was 342; 2.1% of total ICU bed days per year. 28% were discharged directly from ICU and 4% had readmissions to ICU.
Of the 74 trainees who responded 69 had managed overdoses; 17.6% did once a week and 33.8% once a month. 97% treated patients with a known history of overdose and 33% had treated the same patient on separate occasions. 45% reported that psychiatric reviews occur on ICU and 24% reported that patients are discharged directly from ICU. The use of ICU resources for overdose is considerable.
**Conclusion:** ICU resources used by patients who have taken overdoses are significant. Care pathways for many conditions requiring ICU are well established, though not readily available for overdoses. With increasing numbers of overdoses [1] care pathways could improve ICU and psychiatric care, particularly if patients are discharged directly from ICU [2]. Further studies are required to assess whether this could improve outcomes and reduce readmission rates after intentional overdose.
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## 11AP04-2

### Are we properly utilising our resources: an outcome of pilot study in ITU over stay of single organ renal failure patients

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**Background:** Intensive care units (ITU) provide vital care and support to critically ill patients with severe and life-threatening illnesses and injuries. This care includes constant close monitoring and support from specialist equipment including ventilator support to hemofiltration. Due to this intense treatment the average cost of an ITU bed per day is about 1700£ per day. It is not uncommon to observe a relatively stable patient in ITU who can be transferred to non-ITU specialist care. One such example is single organ renal failure patients. The prevalence of ESRD in ICU patients ranges between 1.3% and 7.3% and its presence is associated with a higher degree of morbidity and mortality in these patients. Once these patients are stable they can be transferred to renal unit for further care. In this pilot study we looked at the over stay of patient with ESRD in ITU and its financial implications of healthcare system.
**Methods:** We performed a retrospective study from January 2013 to December 2014 to identify patients with ESRD with over stay in ITU. We identified causes of delay in their transfer and its impact on ITU services.
**Results:** We identified 35 patients with average of 4.5 days of over stay. The single most important cause was non-availability of beds in renal units. These patients were not able to more to non-renal units because of their requirement for hemodialysis. This over stay accounted for about £100k extra money per year.
**Discussion:** Intensive therapy is backbone of medical care and management. A quick but safe turn over of the patients is key in providing ITU care to patients when required. Over stay of the patients in ITU setting have not only a negative psychological impact on patients well being since they think that they are not improving but it also impacts significantly on the cost of care. In this current climate of global financial crisis it is very important to use our resources carefully. We recommend that multidisciplinary care pathways should be established to facilitate transfer of stable patients out of ITU to lessen its burden.

## 11AP04-4

### Use of capnograghy in critical care units - a survey

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**Background:** The use of capnography is a standard for anaesthesia for patients undergoing endotracheal intubation or placement of a laryngeal mask and subsequently while airway devices remain in place. The fourth National Audit Project ,Major complications of airway management' (NAP4) was published in March 2011 (5) and raised particular concerns about complications of airway management in ICU and the emergency department. At least one in four major airway complications reported to NAP4 was from the ICU or the emergency department .Common factors in both the ICU and emergency department included unrecognised oesophageal intubation or unrecognised displacement of tracheal tubes or tracheostomy tubes after patient movement, intervention, or during transport.
Surveys of practice have suggested that capnography has not been universally used in critical care in the UK, 44% of intubations performed in UK ICUs were carried out without the use of capnography to confirm tube placement.
Following NAP4 report ,AAGBI has recommended that capnography should be used during critical care during intubation and mechanical ventilation.The Standards, Safety and Quality Committee of the Intensive Care Society (UK) developed guidelines for use of capnograph monitoring in intensive care units.
**Methods:** We conducted telephone survey with 20 Intensive care units in London area whether capnograph was routinely used during intubation ,in all invasive ventilated patients & patient transfers.
**Results:** 18 hospitals routinely use capnograph in all invasive ventilated patients. 2 hospitals use it only during intubation and transfer.
**Conclusion(s):** Capnograph is widely used in critical care units of NHS hospitals located in London area.
**References:**
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b) 4th National Audit of the Royal College of Anaesthetists and the Difficult Airway Society: Major complications of airway management 2011 Ed Cook T, Woodall N, Frerk C http://rcoa.ac.uk/index.asp?PageID=1089 (accessed 24th May 2011)
c) Kannan, S. and M. Manji. Survey of use of end-tidal carbon dioxide for confirming tracheal tube placement in intensive care units in the UK. Anaesthesia 2003 58: 476-479

## 11AP04-5

### Do check lists improve ward rounds?: A survey of practice at a local intensive care unit

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**Background and Goals:** There are already several checklists used within the NHS- such as the WHO Surgical Safety checklist. Given the dynamic and stressful nature of acute care delivery in the Intensive Care Unit (ICU), it was hypothesised that using a standardised checklist may help improve the quality of Ward Rounds by ensuring essential items are not missed.
The local ICU daily ward round is a multi-disciplinary event, taking place twice a day and when most management/medical decisions are made. It is led by the senior most Intensivist. The local ICU uses a Daily Assessment Form (AF), filed in the patient notes, which records the patient status and needs across 12 clinical topics during the daily ward round. A Checklist (CL) was devised based upon one in use at a sister institution. The intention was to compare the information captured on the AF with the CL items. A further survey of staff was planned to explore their impression of the CL.
**Materials and methods:** Data was collected from the ICU for a two week period. The AF information was compared to the CL. A section of the AF with an entry was considered 'completed'. Directions about medication were assumed to be the same as a review of the drug chart. A questionnaire was designed to investigate attitudes among Staff members to the CL.
**Results and discussion:** Overall, 56 AFs were compared to the CL. Mean completion of AF was 88%.
Topics common to both the DAF and the CL were covered 77% of the time.
5 topics on the CL were rarely covered- these are items not present on the AF.
The staff questionnaire said that 83% of staff members were unsure about the need for all the items on the CL.
**Conclusions:** 12% of AF sections were incomplete, despite exhaustive ward rounds.
Only half the items on the CL were recorded as having been discussed on the AF.
There is clearly need to look at the written records created after the ward rounds.
The Staff Survey suggested that some of the CL items were discussed but not recorded. Some of the CL items would have been covered in the Nursing notes.
We suggest that the best way would be to incorporate the CL items into the AF as well as to move to collaborative notes on the ICU.

## 11AP04-6

### Audit of inadvertent hypothermia in peri-operative critical care patients

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**Background:** Inadvertent hypothermia is not uncommon in the immediate postoperative period and it is associated with impairment and abnormalities in various organs and systems that can lead to increased patient mortality & morbidity and longer hospital stay.It is essential to recognise and implement effective nursing interventions to prevent inadvertent hypothermia. In the UK, the National Institute of Clinical Excellence (NICE) recently published guidelines defining hypothermia as a core temperature below 36ºC.We aimed to assess the incidence of inadvertent hypothermia amongst post surgical patients admitted to our general & neurosurgical ICU patients and audit our compliance with published UK guidelines i.e hourly temperature monitoring and documented use of warming devises.

**Methods:** We conducted a retrospective analysis on all post surgical patients admitted to ICU in our trust over a period of one month. Temperature measurements were recorded on admission to the ICU and throughout the duration of their admission.
**Results and discussion:** 65 post surgical patients were admitted to ICU over a period of month. Frequency of expected temperature readings-1560, frequency of temperature recorded -512 (33%), hence the frequency of inadvertent hypothermia is high. 31(48%) of post surgical patients had temperature less below 36ºC and only 2 (6%) patients had documented use of warming devises.
**Conclusion(s):** Inadvertent perioperative hypothermia is common but preventable complication which is associated with poor outcomes for patients. Our audit showed that our ICU is not compliant with the NICE guidelines. We plan to re-audit after our departmental meeting and a period of staff education.
**References:**
1. Karapillai D et al. Inadvertent hypothermia & mortality in post operative Intensive care patients. Anaesthesia 2009:64(9):968-972)
2. Wong A Masters J, Morgan G. Inadvertent hypothermia on a general intensive care unit- an audit of NICE guidelines in over 500 patients. Intensive care society state of art meeting 2010
3. NICE Clinical Guidelines 65, Perioperative hypothermia (Inadvertent) NICE. London 2008

## 11AP04-8

### Noise in the intensive care unit: fiction or fact?

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**Background and Goal of Study:** Noise exposure in the intensive care unit can have a negative impact on patients' well-being as well as on optimal functioning of both nursing and medical staff.
The WHO recommends average sound levels for hospital wards below 35 dBA with a maximum of 40 dBA at night time (1).
Reported sound levels in Intensive Care Units are significantly higher with average sound levels always exceeding 45 dBA and for 50% of the time exceeding 52 dBA (2).
After several patient complaints and remarks from the nursing staff as well as the medical staff about noise, we wanted to assess a potential noise problem by measuring sound levels in one ward (12 beds) of our ICU.
**Materials and methods:** A sound level meter (Amptec 10EaZy RT) was placed bedside in a two-bed room as well as at the nursing station. Measurements were performed after a two week adjustment period to avoid a Hawthorne effect.
Sound levels were continuously recorded for 24 hrs at each location.
**Results and discussion:** Bedside, average sound levels were 52.8 dBA during the night and 54.6 dBA during the day. Fourteen sound peaks above 80 dBA were recorded with the highest peak at 101.1 dBA.
At the nursing station, average soundlevels of 52.6 dBA at night time and 53.9 dBA at day time were recorded. Here, we noticed 11 peaks above 80 dBA with a maximum sound peak of 90.6 dBA.
Those measurements are significantly above the WHO recommendations of 35 $dBA_{LAeq}$ and 40 $dBA_{LAmax,}$ but comparable with other ICU recordings.
**Conclusion(s):** The sound levels in our ICU clearly exceeded the WHO recommendations but are comparable with sound levels in other ICU's (1-2).
Those elevated sound levels as well as frequent sound level peaks can be responsible for the subjective feeling of noise pollution experienced by patients, nurses and doctors.
In our department, measures should be taken to reduce the average sound level on one hand and the incidence and altitude of sound level peaks on the other hand.
**References:**
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2. Darbyshire and Young Critical Care 2013, 17:R187

## 11AP04-9

### Post educational audit on nurses' awareness and ability to diagnose delirium in a cardiothoracic intensive care unit - a service improvement project

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**Background and Goal:** An audit in an 18 bedded Cardiothoracic Intensive Care Unit (CTICU) in July 2014 showed that there was significant lack of knowledge amongst the nurses on delirium and it's screening tool[1] . Subsequently educational intervention aimed at improving nurses' awareness of delirium and knowledge of Confusion Assessment Method for ICU (CAM-ICU) took place. The re-audit aimed to:
- Assess nurses' awareness of delirium and CAM-ICU subsequent to educational intervention.
- Seek further information on factors preventing nurses from using CAM-ICU in daily routines.
- Determine the feasibility of implementing CAM-ICU in CTICU.

**Materials and methods:** Education consisted of multiple bedside 1:1 teaching via demonstration, observation, active listening, mandatory sessions, mock CAM-ICU and brainstorming interactions. A prospective, non-probability, convenience sample of nurses in CTICU was used. Similar questionnaire for both pre and post educational audit was applied. Data was collected electronically in April 2015, exported to excel and analysed. Statistical analysis was performed using independent sample T-test.
**Results and discussion:** 79 out of 100 nurses answered the questionnaire. Re-audit showed that the nurses who named CAM-ICU correctly increased from 31% (n=26) to 80% (n=63) and confidence in using the tool increased from 14% (n=10) to 82% (n=54). The awareness of the nurses on delirium showed significant improvement in the post educational survey ($p<0.0118$). Although 62% (n=49) of the nurses agreed that CAM-ICU could be performed in intubated patients, 71% considered it as the main barrier. Other main barriers were: 35% responders thought that they would not be able make a difference to delirium due to lack of equipment to orientate the patients and 33% stated lack of support from doctors.
**Conclusions:** Educational intervention was successful in increasing nurses' awareness and ability to diagnose delirium on CTICU. Further educational emphasis will be placed on diagnosing delirium in intubated patients. Main barriers such as lack of support from doctors are being currently addressed in a separate audit. Targeting areas of difficulties may make implementation of CAM-ICU in daily practice feasible.
**Reference:**
1. Sikhamoni S, Crerar-Gilbert A. ,Awareness and knowledge on how to diagnose delirium amongst the nursing staff in CTICU within a London teaching hospital'. European Journal of Anaesthesiology, e-supplement, 2015; 32 (53).

## 11AP04-10

### Medical staff awareness and knowledge of diagnosing delirium in ICU

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**Background and Goal of Study:** A previous audit on our Cardiothoracic Intensive Care Unit (CTICU) showed a deficiency in nursing staff knowledge on diagnosing delirium. Doctors are an important part of the multidisciplinary team and are expected to support nursing staff in their task of delirium diagnosis. It is assumed that a doctors' knowledge is superior to the average knowledge of nursing colleagues. This audit seeks to determine whether doctors appreciated the prevalence of delirium and were able to diagnose it.
**Materials and methods:** In March 2015 an anonymous questionnaire was designed and distributed to all medical staff on the unit, regardless of seniority. Ten personalised questions assessed level of training, role and years of experience. Other questions were related to type of delirium, its incidence and a specific focus placed on the responders' ability to use the confusion assessment method in intensive care unit (CAM-ICU). Ethics committee approval was not required.
**Results and discussion:** A total of 21 respondents replied to the questionnaire; 4 were consultants and 17 were junior doctors. The CTICU unit employs 26 doctors including 10 consultants and 16 juniors.

52% of respondents stated incidence of delirium on CTICU to be 20-30% with 39% stating it was less than 20%. The actual incidence on CTICU is 24%.
62% recognised that hyperactive delirium was more common than hypoactive. The reported incidence on CTICU is 69% for hyperactive delirium and 31% for hypoactive. However, majority of doctors underestimated incidence of hyperactive delirium. 52% of doctors said incidence was 10% or less, 19% thought it was between 10-20% and 29% felt it was 20% or greater. In regards to incidence of hypoactive delirium 65% said it was upto 10% and 35% speculated it was 10% or greater.
When asked if they would benefit from formal delirium diagnosis training 62% said yes and 29% were not sure. 36% rarely or never performed the CAM-ICU assessment. Furthermore, 53% were familiar with the tool but not confident in using it.
**Conclusion:** Our study demonstrated that whilst medical staff are aware of delirium within a CTICU setting, there is a marked variation in its perceived incidence and insufficient appreciation of incidence of hypoactive form of delirium. This may be linked with doctors' lack of knowledge on how to use CAM-ICU, poor motivation and uncertainty on whether they would benefit from training on how to diagnose delirium.

## 11AP04-11

### Obstructive sleep apnea in the intensive care unit - prevalence studied prospectively by diagnosis, the STOP-BANG questionnaire and oxygen desaturation index

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**Background and Goal of Study:** The prevalence of obstructive sleep apnea (OSA) in the intensive care unit has not been investigated in a prospective study. OSA has been identified as an important co-morbidity in the perioperative period, leading to adverse outcomes postoperatively (1). The prevalence of OSA is 9-24% in the general population and a large part of OSA patients are undiagnosed. Thus, it is likely that there are a significant number of patients with OSA in the intensive care unit (ICU)
The overall aim was to explore the prevalence of OSA and patients at high risk for OSA in the ICU by using the STOP-BANG screening questionnaire and oxygen desaturation index post ICU.
**Materials and methods:** After IRB approval and written consent by the patient or a relative, adult patients were recruited upon discharge from the intensive care unit . OSA-diagnosis, the STOP-BANG screening questionnaire and oxygen desaturation index derived from nocturnal pulse oximetry were used to approximate the prevalence of OSA among intensive care patients.
**Results and discussion:** 38 patients were included. The prevalence of OSA was 13.2%, and 76.3% of the patients had a high risk of OSA according to STOP-BANG. ODI was lower among patients negative at STOP-BANG compared to patients who were positive at STOP-BANG. The number of samples were lower than expected because many patients regarded the pulse oximeter as an inconvenience or too invasive.
**Conclusion(s):** The prevalence of OSA in the intensive care unit is equal to the prevalence in the general population, but screening with the STOP-BANG questionnaire reveals a large discrepancy between diagnosed patients and patients at risk of OSA. A positive result on STOP-BANG therefore merits further investigation.
**Reference:**
1. Memtsoudis SG, Besculides MC, Mazumdar M. A rude awakening--the perioperative sleep apnea epidemic. N Engl J Med. 2013;368(25):2352-3.

## 11AP04-12

### The impact of delirium on clinical outcomes in multi-center Thai surgical intensive care units: a prospective cohort study

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**Background and Goal of Study:** Delirium in intensive care units (ICU) increases risk in prolonged mechanical ventilation, hospitalization, and mortality rate.[1] The purpose of this study is to determine if delirium in the surgical intensive care units (SICU) is an independent predictor of clinical outcomes during hospitalization.
**Materials and methods:** A multi-center, prospective cohort study was conducted between April 2011 and January 2012. All patients who were admitted to nine university- based SICU were enrolled. The clinical outcomes of study included duration of mechanical ventilation, length of hospital stay, and 28 day mortality. Cox proportional hazard regression model was used to assess the effects of delirium on ICU and 28 day mortality.
**Results and discussion:** A total of 4,450 patients were included. One hundred and sixty two patients were diagnosed delirium (3.6%, 162 of 4,450). Patients who died in the hospital were significantly older (64.3±17.1 years versus 61.6±17.2 years, p <0.001), had higher percentage of male gender (64.2% versus 57.7%, p = 0.003), higher Acute Physiology and Chronic Health Evaluation II score (APACHE II) (19 (13-26) versus 10 (6-14), p<0.001), and higher incidence of delirium (7.8% versus 3.0%, p<0.001) compared to survivors. These patients also had significant longer ICU stay (4 (2-10) versus 2 (1-3), p<0.001), and longer ventilator day (4 (2-10) versus 2 (1-4), p<0.001). After adjusting for age, gender, and APACHE II score, delirious patients with and without mechanical ventilation had a 38% and 97% greater risk of 28 day mortality (adjusted HR = 2.38, 95% CI: 1.36-4.18, p = 0.002 versus adjusted HR = 1.97, 95% CI: 1.19-3.26, P = 0.008), respectively. The present study found that delirium was an independent predictor of hospital mortality, corresponded to previous studies.[1,2]
**Conclusion(s):** Delirium in ICU was a major predictor of hospital mortality after adjusted for relevant covariates in both patients with and without mechanical ventilation.
**References:**
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2. Lin SM, Liu CY, Wang CH, et al. The impact of delirium on survival of mechanically ventilated patients. Crit Care Med. 2004; 32: 2254-9.
**Acknowledgements:** This study was supported through funding by the Royal College of Anesthesiology of Thailand, National Research Council of Thailand.

## 11AP04-13

### Assessment of agreement and clinical interchangeability between the *TEG5000® and* TEG®6s thromboelastography haemostasis analysers: a prospective validation study

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**Background and Goal of Study:** TEG®6s and TEG®5000 (Haemonetics Corp, USA) are commercial haemostasis analysers that measure viscoelasticity properties of whole blood. Both use different mechanisms to assess identical coagulation variables.
The aim of this study was to assess agreement and clinical interchangeability between the TEG® 6s and TEG®5000 analysers.
**Materials and methods:** After Ethics Committee approval, we systematically collected 3.5mL whole blood in citrated tubes from 25 adult patients in a tertiary level intensive care unit (ICU). A trained operator, proficient in the use of both the TEG® 6s and TEG® 5000 systems performed all the measurements. Interdevice agreement between the TEG®6s and TEG® 5000 analysers was measured using Lin's condordance coefficient, and further validated this

using intraclass correlation coefficients and reduced major axis regression, which allowed separation of the observed bias into fixed and proportional components.
**Results and discussion:** Sixteen (64%) patients were male; the mean (SD) age was 61 (17) years. Admission ICU diagnosis: post-cardiac surgery (24%), decompensated liver disease (16%), post-liver transplantation (16%), post-general surgery (8%), neurological injury (16%), other critical illness (12%). We found that the TEG®6s and TEG® 5000 systems were broadly interchangeable. There was slight agreement, with a proportional bias of LY30% between the analysers. All other TEG variables demonstrated almost perfect or substantial agreement, with minimal fixed bias or proportional bias, with the exception of MA, which demonstrated a fixed, non-proportional bias. Between the TEG® 6s and TEG®5000 platforms, Lin's concordance correlation coefficients (95%CI, slope, intercept) were R-time: 0.86 (0.76-0.96, 0.85, 0.41); K-time: 0.79 (0.65-0.94, 1.21, -0.87); Alpha Angle: 0.70 (0.49-0.90, 0.84, 10.74.10); Maximum Amplitude (MA): 0.90 (0.84-0.97, 0.97, -3.5); LY30%: 0.32 (0.12-0.52, 0.36, -0.03).
**Conclusions:** In adult patients in the intensive care and post-operative environments, across a variety of pathophysiological states, there was almost perfect agreement in the R-time and MA, substantial agreement in K-time and Alpha Angle, and slight agreement in LY30% between the TEG® 6s and TEG®5000 analysers. With the exception of LY30%, the TEG®6s and TEG® 5000 platforms were clinically interchangeable. This has important implications for use in clinical practice and in multi-site research programs.

## 11AP04-14

### Guiding intravenous fluid therapy in a cardiothoracic intensive care unit: a prospective audit

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**Background and Goal of Study:** Cardiac output (CO) monitoring has become the standard of care in intensive care units (ICU) as the technology has become less invasive and less user dependent. Validated protocols exist using dynamic measures of preload to optimise the dose of intravenous fluid (IVF). Other predictors of fluid responsiveness such as urine output, blood pressure and central venous pressure are poor discriminators. An audit was conducted to identify the frequency of CO monitoring and rationale for the administration of IVF.
**Methods:** A prospective audit was undertaken over a two-week period including all elective and emergency cardio-thoracic surgical patients. The data was collected using a pro-forma and analysed using Microsoft excel and unpaired t-test.
**Results and discussion:** A total of 30 patients met inclusion criteria. The mean age was 67.4 years and the mean APACHE II score was 22.97. All patients had CO monitoring via LiDCO™ or a pulmonary artery catheter. Indications for IVF administration included hypotension (38.8%), low urine output (22.4%), CO monitoring response (20.4%), raised lactate (16.3%) and high drain output (2%). A mean of 1347 ml of IVF per patient was administered without appropriate CO monitoring or response in 24 hours. 79.6% of patients had fluid administered using static measures of preload. There was no significant difference in overall fluid balance, ventilator hours, vasoactive therapy duration or length of ICU admission, when comparing patients who had the majority (>75%) of IVF guided by CO monitoring and those who had less-guided therapy (<75%). However patients who had the majority (>75%) of IVF guided by CO monitoring had a lower percentage of Clavien-Dindo grade 2 or above post-operative complications in comparison to those had <75% CO monitoring guided IVF.
**Conclusion(s):** Poor physiological discriminators of fluid responsiveness were frequently used to guide IVF administration, even though CO monitoring was performed in all. A significant amount of IVF was administered without CO monitoring in the first 24 hours of admission.CO monitoring and adherence to validated protocols have been demonstrated to improve important patient outcomes, if used correctly. The reasons for inappropriate use may be multifactorial and may include uncertainty regarding the interpretation of dynamic indices of preload. A multi-disciplinary training session and CO guidance cards are planned to improve performance.

## 11AP05-2

### Lactate/pyruvate ratio (LPR) and mitochondrial dysfunction (MTdys): a physiopathology study of metabolic penumbra in spontaneous intracerebral hemorrhage (SICH)

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**Background and Goal of Study:** The physiopathology of the edema surrounding SICH is poorly understood. The scientific debate has been focused on the possibility that the origin of this secondary cerebral injury can be related to either an ischemic or metabolic penumbra.
The aim of our study was to investigate the changes in cerebral metabolism of the peri-hematomal tissue through use of microdyalisis, focusing on LPR values to verify if they are linked to ischemia or MTdys. Altered LPR values with low pyruvate concentration is typical of ischemic damage. On the contrary MTdys is characterized by an high LPR values, but normal pyruvate. Distinguish if one of the two physiopathology mechanisms predominates, can be useful to understand the prime target therapy in secondary cerebral injury.
**Materials and methods:** 9 patients with a GCS $\leq$8, brain CT diagnosis of SICH were enrolled. Microdyalisis probes were placed as close as possible to the perihemorragic area to measure extracellular cerebral metabolites hourly (glucose, glutamate, lactate, pyruvate from which the LPR was derived). Values are expressed in percentage of samples with measurements falling outside of the normal range. A logistic model has been used to verify the relation between microdalysis measurements.
**Results and discussion:** Of the 9 patients enrolled, LPR was altered in 48.1% of the total 237 samples analyzed. Of the altered samples, LPR correlated with a low value of pyruvate only in 14.9% samples, indicating an ischemic pattern. The other 85.1% samples with an altered LPR were characterized by a normal pyruvate, consequently indicating the presence of MTdys. We can underline a different importance between MTdys and ischemia. It may be possible that the main alteration is not correlated to the low concentration of oxygen and substrates, as instead is the case during ischemia. The finding of a high LPR alteration in the presence of a normal pyruvate concentration could be correlated to an inability of peri-hematomal cell mitochondria to utilize oxygen and metabolic substrates.
**Conclusions:** In literature, as also in this study, the idea that the SICH is surrounded by a "metabolic penumbra", rather than an "ischemic penumbra", has become more accredited. The impairment in MTdys implies that a metabolic alteration is occurring in this tissue, thus it could be useful to understand what are the main mechanisms behind this metabolic dysfunction to focus on future and innovative target based therapy.

## 11AP05-3

### The effect of nimodipine and magnesium sulfate in the treatment and prevention of cerebral vasospasm in subarachnoid hemorrhage caused by rupture of a cerebral aneurysm

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**Background and Goal of Study:** Vasospasm is the leading cause of disability and death from ruptured cerebral aneurysm. To determine the effect of nimodipine and magnesium sulphate in the treatment and prevention of cerebral vasospasm in subarachnoid hemorrhage caused by the rupture of a cerebral aneurysm.
**Materials and methods:** Two groups of patients were formed. Group I: patients to whome, in addition to the standard initial treatment and "3H therapy", nimodipine was administered at a dose of 15-30 mg/kg bw/h (3-10 ml) for the duration of the initial treatment. Group II: patients to whome, in addition to the standard initial treatment and "3H therapy" were administered with $MgSO_4$ at a dose of 12 grams in 500 ml of 0.9% NaCl/24 h during the initial treatment.
**Results and discussion:** The progression of WFNS value (worsening of clinical condition) occurred in 30% of patients by observing both groups. There were no significant differences in progression of WFNS value during the initial treatment according to the groups (p=0.529). The worsening state of consciousness occurred in 32% of patients, measured by the GCS scale between the first and the tenth day, but there were no significant differences

between groups (p=0.804). Regression analysis was applies, which included all potential predictors of outcome in the model. None of the parameters is not identified as a good predictor of the outcomes: WFNS (95% CI 0.52 to 6.95, OR=1.9, p=0.365), nimodipine therapy or magnesium sulfate (95% CI 0.29 to 8,79, OR=1.6, p=0.597). The research has confirmed the safety and feasibility of continuous infusion of high doses of intravenous MgSO4 in patients with SAH aneurysmal origin.

**Conclusion(s):** The outcome of the treatment 30 days after the occurrence of SAH, analyzed with the WFNS and GOS values, is not dependent on the method of prevention and treatment of vasospasm. Overall, calcium channel block reduce the risk of adverse outcomes.

**References:**

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## 11AP05-4

### Mortality of critically ill patients with non-traumatic intracranial hemorrhage: role of interhospital transfer, septic shock and timely surgical intervention

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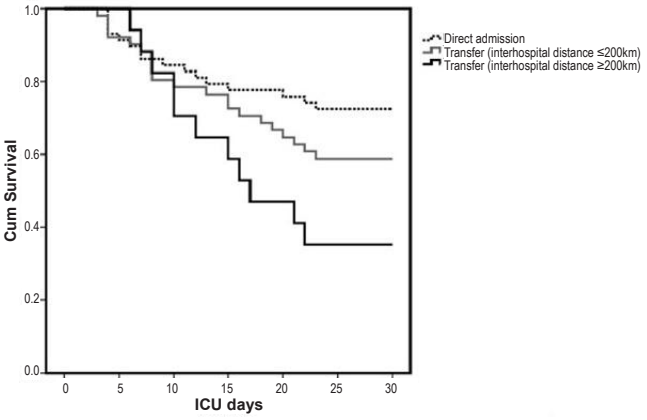
**Background and Goal of Study:** Intracranial hemorrhage (intraparencymal or subarachnoid) is an important cause of morbidity and mortality. The aim of the study is to determine predictors of mortality among patients with spontaneous intracranial hemorrhage hospitalized in an Intensive Care Unit.

**Materials and methods:** All patients with intracranial hemorrhage admitted in the Intensive Care Unit of the University Hospital of Patras, Greece during a five-year period (January 2010 to December 2014) were included. Data were prospectively reported and collected from the Intensive Care Unit computerized database.

**Results and discussion:** Of the 126 patients included, 72 (57%) suffered from subarachnoid hemorrhage, whereas the remaining 54 (43%) from intraparencymal hemorrhage. Overall mortality was 44% (56 patients). Twenty-one patients (17%) were characterized as having irreversible brain damage and did not receive any surgical treatment. Mortality was significantly associated with were severe sepsis or septic shock (P 0.003; OR 16.6; 95% CI 2.6-106.0), GCS ≤7 after removal of sedation (P <0.001; OR 83.9; 95% CI 12.5-563.0), and transfer from a hospital with distance >200km or on island (P 0.015; OR 14.0; 95% CI 1.7-116.9) while surgical intervention before ICU admission was identified as a predictor of a good prognosis (P 0.011; OR 0.22; 95% CI 0.12-0.70). Since transfer of patients was associated with increased mortality, an analysis of factors that differ among transferred patients (n=68) and those that directly admitted (n=58) to our ICU was performed. Multivariate analysis revealed that GCS ≤7 upon intubation was associated with transfer of patients (P 0.002; OR 3.2; 95% CI 1.5-6.6). Figure depicts a Kaplan-Meier curve of survival probability according to direct admission or transfer from another hospital.




*[Figure:Kaplan-Meier curve of survival]*

**Conclusion(s):** Transferred patients had lower survival rates. Severe sepsis constitutes as an important complication among Greek critically ill patients with intracranial hemorrhage associated with reduced survival.

## 11AP05-5

### Functional isotope imaging evaluation of terutroban efficiency in a pro-inflammatory rat model of subarachnoid haemorrhage (SAH)

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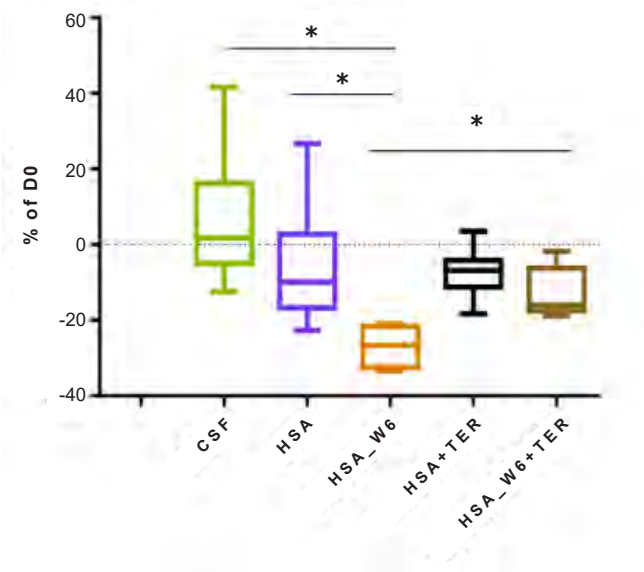
**Background and Goal of Study:** Delayed cerebral ischaemia (DCI) is the first cause of morbidity after subarachnoid haemorrhage (SAH). F2-isoprostanes and eicosanoids were found in the cerebrospinal fluid (CSF) of patients with DCI. These potent vasoconstrictors induce platelet aggregation and mediate inflammation by a thromboxane-prostaglandine (TP) receptor binding. The aim of our study was first to estimate the occurrence of DCI in a pro-inflammatory state using an high-omega 6 polyunsaturated fatty acid (w6) diet and secondly to evaluate the efficiency of terutroban (TER) a TP receptor inhibitor.

**Materials and methods:** Ninety wistar rats (400g) were randomly assigned to one of 5 groups: a double 250$\mu$L intracisternal injection of autologous arterial blood (SAH groups) or artificial CSF (CSF group) was performed. To induce a proinflammatory state animals were fat with w6 during 6 weeks before SAH procedure (SAH_w6/SAH_w6+TER). TER was administered (30mg/kg/day) during 5 days following SAH (SAH+TER/SAH_w6+TER groups). Evaluation of uptakes of 3 [99mTc]-radiolabeled agents was achieved using microSPECT/CT imaging: HMPAO at D5 for cerebral perfusion quantification; DTPA at D3 for blood brain barrier (BBB) integrity study; and AnnexinV at D4 for apoptotic activity study. ANOVA followed by Student's t test.

**Results and discussion:** HMPAO uptake analysis showed a significant decrease in the SAH group (figure). DTPA and AnnexinV uptake were also significantly increased in the SAH group compare to the CSF group. Proinflammatory state before SAH dramatically decreased HMPAO uptake (figure); increased DTPA (0.37±0.04 *vs.* 0.43±0.01 Mbeq/mm$^3$; $P<0.05$) and AnnexinV (0.39±0.03 *vs.* 0.48±0.03 Mbeq/mm3; $P<0.05$). TER significantly counteracted the decrease in HMPAO uptake (figure) and the increase in DTPA uptake ($P<0.05$) and in AnnexinV uptake ($P<0.001$) induced by SAH.




*[99mTc-HMPAO uptake at D5 expressed in % of D0]*

**Conclusion:** For the first time, a pro-inflammatory SAH rat model of DCI has been described. microSPECT study shows that a proinflammatory diet dramatically increases apoptosis and DCI. TER improved hypoperfusion, BBB disruption and apoptosis. TP receptor antagonists could be promising treatments after SAH.

## 11AP05-6

### Relation between metabolic and hemodynamic derangements in patients with spontaneous intracerebral hemorrhage: the use of cerebral microdialysis and cerebrovascular autoregulation

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**Background and Goal of Study:** Literature regarding brain metabolism and cerebrovascular autoregulation (CVA) status in the peri-hemorrhagic region of spontaneous intracerebral hermorrhages (SICH) is contrasting. We assessed metabolic and autoregulation parameter changes in this area in order to investigate the association between hemodynamic and biochemical impairment and their correlation with outcome.
**Materials and methods:** We enrolled patients with SICH, a GCS≤8 , who required invasive intracranial pressure (ICP) monitoring. Mean arterial pressure (MAP), ICP and cerebral perfusion pressure (CPP) were continuously recorded. The Pressure Reactivity index (PRx) was calculated online as the moving correlation coefficient between MAP and ICP and was used to derive CVA. Optimal CPP (CPPopt) was defined as the CPP where PRx reaches its lowest value when plotted against CPP.
A microdialysis probe was placed in the peri-hemorrhagic area in order to measure the glucose, lactate, pyruvate, glutamate, glycerol concentrations and to calculate lactate/pyruvate ratio (LPR). Outcome was assessed at 3 months using the modified Rankin Scale (mRS).
Correlations between metabolic and hemodynamic alterations, outcome, percentage of time during which CPP was within CPPopt range were investigated with a multivariable statistical analysis model.
**Results and discussion:** A total of 9 patients with SICH were included. Values indicative of disturbed autoregulation, characterized by a PRx value >0.2, were associated with worse metabolic parameters: higher glutamate (P=0,0034) and LPR levels (P=0,0015), lower glucose concentration (P=0,0118). Low brain glucose was associated with an unfavorable outcome (P=0,0211). There was a significant correlation between increased concentrations of glutamate, PRx and outcome (P=0,0115). Real-time identification of CPPopt is possible in ICH patients, however, the correlation between metabolic pattern and the percentage of time CPP remained within the CPPopt range was not statistically significant.
**Conclusions:** Multimodality monitoring in the peri-hemorrhagic penumbra is feasible in ICH patients. Glutamate and glucose levels and LPR significantly correlated with CVA dysfunction, furthermore, glutamate and glucose correlated with outcome. Although assessment of CPPopt through use of PRx was possible in SICH, no significant correlation between the metabolic pattern and time patients remained within CPPopt range to outcome was present.

## 11AP05-7

### Prognostic value of intracranial pressure dynamics in condition of intermittent high-volume haemofiltration in patients with severe sepsis

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**Background and Goal of Study:** Renal replacement therapy technique itself can have a direct impact on dynamic increase of intracranial pressure. That is why the goal of the study is to determine the prognostic value of ICP dynamics in conditions of intermittent high- volume hemofiltration (HVHF).
**Materials and methods:** The retrospective study in 134 patients with severe sepsis and normal ICP before HVHF was performed. Based on the dynamics ICP patients were divided into two groups: 1 (n = 81) - with no changes in ICP; 2 (n = 53) - with further increase of ICP. ICP was determined by measuring the pressure in the central retinal vein.
**Results and discussion:** The level of lactate was raised in both groups before HVHF. But the 2 group lactate levels have not returned to normal values (2,1 (1,8-2,4) before and 1,9 (1,6-1,9)mmol/l after HVHF), and there was also a dramatically decrease in the oxygenation index: ΔpO2 / FiO2- 171,2 despite an increase in the fraction of inspired oxygen (ΔFiO2 = 5%) in this group. Using ROC-analysis, we assessed the relationship of the score of GCS before the HVHF with the risk of intracranial hypertension after HVHF: the measured initial GCS score showed a very good sensitivity and specificity (AUROC = 0,91), with the “cut-off point” for registration values GCS <10 points. The mechanism of the growth of intracranial pressure in patients of this group can be attributed primarily to disturbances of microcirculation, which, on the one hand, shows an increase of arteriovenous pCO2 difference of more than 8,4 (6,7-9,2) mm Hg after the procedure, as well as depression of consciousness, as a manifestation of septic encephalopathy, in which circulatory disorders in the brain and changing the permeability of the blood-brain barrier occurs and may lead to disruption of water transport and the formation of cerebral edema.
**Conclusion(s):** Our study demonstrated the benefits of ICP monitoring in patients with indications for renal replacement therapy. Efficiency of HVHF was determined by the absence of further increasing intracranial pressure. Patients with recorded values of <10 points on the GCS are at high risk of intracranial hypertension after the procedure HVHF.
**Reference:**
Musaeva T.S., Zabolotskikh I.B., Berdnikov A.P. Intermittent high-volume hemofiltration in patients with severe sepsis and intracranial hypertension/ EJA. 2014. T. 31. № S52. C. 206.

## 11AP05-8

### Effect of hypertonic saline on survival in an experimental embolic model of massive cerebral infarction with severe brain swelling

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**Introduction:** Brain swelling is the most feared complication of malignant stroke with massive brain infarction. The high mortality of such complications is directly related to intracranial herniation due to swelling. Hypertonic saline has been favorably used as a hyperosmolar agent for the past decades in various intracranial pathological conditions. In this study, we evaluated hypertonic saline in the treatment of such conditions in rat model of malignant stroke. Our primary end point was 24-hr mortality, and our secondary end point was brain water content.
**Methods:** A total of 45 adult male rats were studied with a catheter implanted in the internal carotid artery. After discontinuation of isoflurane anesthesia, a clot was injected into the internal carotid artery with the rats conscious and freely moving in their home cage. The rats were divided into three groups to receive normal saline (Group 1 control) or 36 mOsm/kg solution of either 10%

hypertonic saline (50-50 chloride-acetate; Group 2) or 30% hypertonic saline (Group 3). Treatment consisted of a 60-min loading beginning 5 min after embolization and followed 300 mins later by a 34 mOsm/hr infusion of the same solution for 22 hrs. Twenty-four hours after embolization, blood was sampled for measurement of sodium and osmolality. Rats were then killed under deep anesthesia, and the brain was harvested for measurement of water content. Brain water contents were derived by wet/dry weight ratio.
**Results:** Twenty-four-hour mortality was significantly reduced in both hypertonic saline treated groups (NS = 58 %; 10% HS = 30 %; 30% HS = 25 %, $p<0.05$). Twenty-four hours after embolization, the water content on the infarcted hemisphere was unchanged for those that survived in NS or HS treated rats (NS = 83.1 ± 1.1 %; 10% HS = 83.0 ± 1.1 %; 30% HS = 83.8 ± 0.7 %), whereas the HS-treated contralateral hemisphere was significantly decreased (NS = 79.1 ± 0.6 %; 10% HS = 77.4 ± 0.8 %; 30% HS = 77.4 ± 0.6 %; $p<0.05$). Serum sodium was unchanged in NS-treated rats, but increased significantly in HS-treated rats (10 % HS = 151.8 ± 6.5 mEq/L; 30% HS = 155.5 ± 6.6 mEq/L, $p<0.05$).
**Conclusions:** HS reduced contralateral hemispheric water content but did not affect ipsilateral brain water content when compared to NS. We conclude that sustaining a hyperosmolar state for one day with hypertonic saline is effective in reducing mortality following experimental malignant embolic stroke.

## 11AP05-9

### Prognostic factors in traumatic brain injury

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**Background and Goal of Study:** Worldwide, the incidence of TBI is increasing. In Europe, approximately 2.5 million people will sustain a TBI each year, of whom 1 million need to be admitted to hospital and 75,000 die. Survivors experience a substantial burden of physical, psychological, and psychiatric disability.
The main goal of this study is to examine whether prognostic factors like clinical scales (Glasgow Coma Scale [GCS], Injury Severity Score [ISS], radiographic scales based on admission computed tomography (Marshall)), pBtO2 and pBtO2/paO2 ratio and classic prognostic factors (hypoxemia, hypotension, low BIS or NIRS, high ICP levels and GCS) are associated with clinical outcome after severe TBI.
**Materials and methods:** This is prospective observational study with institutional review board approval. Patients with traumatic brain injury and a Glasgow Coma Scale score<8 were identified on admission. Glasgow Coma Scale [GCS], Injury Severity Score [ISS], radiographic scales based on admission computed tomography (Marshall), pBtO2 and pBtO2/paO2 during first 24 hours were recorded. Patient outcome was determined as favourable or unfavourable using the Glasgow Outcome Scale by medical record review at 6 months after TBI. We considered an ordinal analysis with proportional odds methodology, which reflects prognostic effect across the various GOS categories. The strengths of the associations were expressed as odds ratios with 95% confidence intervals. A logistic regression model was used to calculate the 95% CI for the odds of unfavourable outcome.
**Results and discussion:** Over a 3-year period, 46 patients were entered. Mean age was 37±17.4 years, injury severity score was 27.7±10.7, and Glasgow Coma Scale score was 5.2±3.4. At 6 months, 9 patients (19.57%) had died and survival was 80.43% (37 patients). Favourable outcome was 59.3% and unfavourable 42%. All the parameters studied demonstrated statistical correlation with the patient outcome assessed at 6 months after injury using the GOSE ($p<0.001$).
**Conclusion(s):** There are many outcome prognostic factors that demonstrated statistical correlation with the patient outcome, and this could serve as an important therapeutic tool.
**Acknowledgements:** A multidimensional approach to outcome assessment is essential, to ensure that the full impact of injury is captured. In this way, identification of key predictors is essential to establishing an appropriate plan of care.

## 11AP05-11

### Relationship between the Bispectral Index, the Glasgow Coma Scale and the Intracranial Pressure in patients with severe brain injury

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**Background and Goal of Study:** There have been some studies suggesting that the bispectral index (BIS) can reflect the level of consciousness in brain-injured patients, as assessed by the Glasgow Coma Scale (GCS). However, the correlation degrees are very wide depending on the study groups and the software version of the BIS. Whilst the level of consciousness is assessed by the GCS, changes in the intracranial pressure (ICP) can allow for early diagnosis of mental status alteration as it precedes clinical deterioration.
This prospective and observational study was performed with the aim of determining if there is any correlation between these three commonly used brain monitoring measures in the patients with severe brain injury.
**Materials and methods:** Thirty patients with a focal neurological injury (e.g. intracerebral hematoma) or a more global injury (e.g. traumatic diffuse axonal injury), who had been admitted to the neuro-intensive care unit and had not received any sedative medication for over 24 hours, were prospectively evaluated for the GCS every hour for 5 hours by a blinded observer. Meanwhile, an investigator noted the patient's BIS and ICP simultaneously. The BIS was measured with a BIS monitor, Model A-3000 vista™ (Aspect Medical Systems, Norwood, USA) and the ICP with Spiegelberg Brain Pressure Monitor (Spiegelberg, Germany). The correlations among the BIS, the GCS and the ICP were determined using Spearman's rank correlation coefficient and Pearson's correlation coefficient, accordingly.
**Results and discussion:** In spite of statistical significance ($p<0.01$), the BIS was moderately correlated with the GCS ($r=0.423$) and poorly correlated with the ICP ($r=0.212$). ICP were never correlated with GCS ($r=-0.118$). There was a wide range of the BIS values for any level of the GCS and the ICP. Two reasonable explanations for this poor correlation of the BIS with the ICP and the GCS with the ICP can be proposed. First, the ICPs of patients recruited in this study were relatively well maintained in the range of 8-13 mmHg. Second, each value of the ICPs had already been reflected in the BIS and the GCS.
**Conclusion(s):** Judging from the moderate correlation between the BIS and the GCS, and wide variability, the BIS may carefully be used for assessing the level of consciousness in brain-injured patients, as assessed by the Glasgow Coma Scale (GCS).

## 11AP06-1

### Management of patients with suspected bacteraemia with the aim of combining curative efficacy and reduction of occurrence of MDR germs

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**Background and Goal of Study:** A time-bound targeted antibiotic therapy is cornerstone in the treatment of sever sepsis and septic shock. Whereas a delay in administering an antimicrobial therapy increases mortality rates[1], a widespread and prolonged use of an empiric therapy upsurges the occurrence of multi drug resistant germs (MDR)[2]. The implementation of rapid diagnostic testing (RDT) via matrix-assisted laser desorption/ionization (MALDI-TOF) reduces the time to microbial identification, minimizing the overall exposure to an empiric therapy[3]. We sought to evaluate the incidence of MDR and the mortality rate in a cohort of ICU patients presenting bacteraemia treated according to an internal protocol that implements RDT.
**Materials and methods:** We reviewed all patients consecutively admitted to our ICU from Jan 2014 to Dec 2014 who presented bacteraemia. The management of antibiotic therapy was held according to Fig 1. Demographics, comorbidities, reason for admission, recent exposure to antibiotics, duration of treatment, development of sepsis, severe sepsis or septic shock, and the outbreak of MDR were recorded. Mortality rate was compared with literature data. Incidence of MDR was compared with data coming from other ICUs in the Tuscany region.
**Results and discussion:** Of a total of 920 patients admitted over the study period, 56 presented at least one episode of bacteraemia, and 52 were included in the final analysis (4 excluded for length of stay less than 48h) (Tab 1). As initial management, 31 (60%) patients received empiric therapy and 21 (40%) awaited the results of RDT (Fig 2). Of these, 12 (55%) received targeted antibiotic therapy, and 9 (45%) did not receive any therapy relying on the results of RDT (Fig 3). The median duration of empiric therapy was 1 [0.5-3] day (Fig 4). Overall, 13 patients (25%) presented septic shock, and amongst these, 4 patients (31%) died (Fig 5). The incidence of MDR for E.Coli, MRSA, KP ESBL and KPC was significantly lower compared to the other ICUs of the region (all $P<0.001$) (Fig 6).
**Conclusion(s):** The implementation of RDT via MALDI-TOF in our protocol led to a lower administration of empiric therapy. Mortality rate was similar to literature data. The outbreak of MDR germs was reduced.
**References:**
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2. Rossolini G. M. et al. Clin Microbiology and Inf 2008;14.s6:2-8
3. Verroken A et al. Eur J Clin Microbiol Infect Dis 2014;34:405-13

## 11AP06-2

### The tale of two cases of pertussis with Gram- positive sepsis: Streptococcus pneumoniae and Staphylococcus MRSE. Happy vs sad end: what was different? The first exchange blood tranfusion in Poland for pertussis-induced hyperleucocytosis

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**Background:** Pertussis is a potentially lethal, vaccine-preventable disease. Mortality is high in infants with hyperleucocytosis (HL) and resulting pulmonary hypertension (PH). Coinfections are common but there are few published cases of pertussis and sepsis. The aim is to present 2 such cases, their treatment and possible cause of different outcome.
**Cases presentation:** Both infants (5weeks/3months) had family-acquired pertussis, hyperleucocytosis (HL) resulting in pulmonary hypertension (PH) and cardiac failure (CF), also very high PLT count was observed. We suspected pertussis, but because of the severity of the condition, possibly worsened by sepsis, initially they both received clarithromycine with vancomycine and cefotaxym.
**In case 1:** a rapid increase in WBC to 97000/$\mu$L, progressive CF and extreme PH was resistant to catecholamines and milrinone. Inhaled NO was ineffective. ECMO was not available. We thought about exchange blood transfusion (EBT) but the baby died before, after 14 hours in PICU.
**In case 2:** despite treatment WBC increased at day 4 to 110300/$\mu$L, with rapid clinical deterioration, high 02 demand, CF and signs of PH. Double-volume EBT ( the 1. in Poland) led to rapid improvement, WBC dropped to 31000/$\mu$L. She left PICU after 27days, she is a healthy 1,5-old girl, now.
**Discussion:** Pertussis is a problem due to anti-vaccination movements and low resistance in adults. All modes of treatment should be known to intensivists. HL is an independent mortality risk factor. As it causes PH repetitive ECHOs are mandatory. EBT or leukaferesis are effective in reducing WBC and improve survival. ECMO may be the option for the most severe cases. EBT can be arranged even in small hospitals. In case 2. EBT was life-saving. It is important to consider coinfection especially in clinically severe cases with very high CRP and PCT and extremely high (G"+") or low platelet count (G"-") bacteria. In such cases broad-spectrum antibiotics should be added to macrolide treatment.
**Learning points:**
1. Hyperleucocytosis (HL) + cough should make us think about pertussis. It causes PH and is a risk factor of mortality.
2. Effective therapies for HL exist: exchange blood transfusion and leukaferesis.
3. Macrolide monotherapy for pertussis may be risky if clinical and laboratory findings suggest bacterial coinfection including sepsis. In such cases broad spectrum antibiotics should be added.
4. Vaccination promotion for babies, pregnant women and families is urgently needed.

## 11AP06-3

### A case of invasive Fusobacterium necrophorum infection: the "forgotten" disease

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**Background:** Systemic infections due to F. necrophorum (anaerobic gram-negative bacillus), arising from the oropharynx, are referred to as Lemierre's syndrome, postanginal sepsis or necrobacillosis, but they can all be included under the term of "invasive F. Necrophorum disease" (IFND)[1]. Although it has been well documented for over a century, invasive Fusobacterium infection is rare ("forgotten"), but can result in significant morbidity and mortality [2,3].
**Case report:** A previously healthy 39 year old female presented to the emergency department, with a 3 day history of sore throat, diarrhoea, vomiting, rigors and headache. The patient required aggressive fluid resuscitation, broad-spectrum antibiotics, and vasopressor support for refractory hypotension secondary to sepsis. An initial bedside ultrasound of the abdomen identified a gallbladder collection as a possible source of sepsis, and a percutaneous cholecystostomy was performed. Subsequently CT thorax, abdomen and pelvis revealed consolidation in the posterior lung base, multiple splenic abscesses, free fluid within the abdomen and a thick-walled gallbladder. Whilst the underlying infection source remained unclear, the patient responded well to therapy but continued to complain of left-sided neck tenderness. Blood cultures returned positive for Fusobacterium Necrophorum. Antibiotic therapy was reviewed accordingly. Investigations undertaken to rule out left internal jugular thrombophlebitis/ vein thrombosis (as a source of septic emboli within the spleen) were negative.
**Discussion:** Data supports a rising incidence of IFND thought to be due to restricted use of antibiotics for sore throat in the community [3]. A high index of clinical suspicion should be kept for this "re-emerging" anaerobic gram-negative bacterium in the setting of postanginal septicaemia and metastatic infection.
**References:**
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3. Riordan T. Clinical Microbiology Reviews 2007;20:622-659
**Learning points:** Although uncommon, Fusobacterium Necrophorum invasive disease may result in significant morbidity and mortality. Evidence of metastatic infection should prompt imaging of the internal jugular vein to rule out thrombophlebitis or thrombosis. Management includes antibiotics, with consideration of anticoagulants (confirmed thrombosis) and drainage of collections of pus (such as empyema or abscess).

## 11AP06-4

### Amiodarone and tetracyclines has synergistic antibacterial effect

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**Background and Goal of Study:** Patients treated in intensive care units usully require the intravenous co-administration of drugs with different mechanism of action for acute and chronic illness, infection, pain relief, and sedation. Non-antibiotics may have synergistic antimicrobial effect of an antibiotic in vitro (1). The antifungal synergism of amiodaron and an azole compound for Candida albicans is already known (2). In this study we investigated the impact of amiodarone on the bactericidal effect of antibiotics.
**Materials and methods:** Amiodarone infusion was contaminated with low colony forming units (cfu) of standard bacterial strains (*Staphylococcus aureus* ATCC 25923, *Escherichia coli* ATCC 25922, *Pseudomonas aeruginosa* ATCC 27853) separatelly and bacterial count was checked at intervals. Minimal inhibitory concentration (MIC) of the drugs were determined and compared with serum concentration. Checkerboard method was used for investigation of combined effect of amiodarone and antibiotics with different mechanism of action. We determined the fractional inhibitoty concentration index what is the predictor of synergism.
**Results and discussion:** 5x103 cfu bacteria were not survived in amiodarone infusion after 15 minutes. MIC levels of both drugs are higher than the serum concentration of drugs. There were synergistic antimicrobial effects of combined amiodarone and oxytetracycline against standard bacterial strains.
**Conclusion(s):** The non-antibiotics might have antimicrobial synergistic effect with some antibiotics, thus they may contribute to the killing of pathogens when they are co-administrated. Further research is required whether there is any *in vivo* synergistic effect resemble for the above *in vitro* results.
**References:**
1. Nat Chem Biol 2011; 7: 348.
2. J Med Microbiol 2008; 57:457.

## 11AP06-5

### Prevalence and antibiotic susceptibility of methicillin-resistant Staphylococcus aureus in the surgical ICU of General Hospital 'Prim. Dr. Abdulah Nakaš' Sarajevo - our experience

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**Background and Goal of Study:** The incidence of methicillin-resistant Staphylococcus aureus (MRSA) infections has declined over time in the USA, Europe and Canada, but increased in sub-Saharan Africa, India, Latin-America and Australia. It is not clear whether MRSA is replacing methicillin-susceptible S.aureus infections, or just adding to its overall incidence. With the varying regional patterns of resistance and the importance of those infections, it is prudent to know the local prevalence of MRSA and its' antibiotic sensitivity pattern. The goal of this study is to determine the prevalence and antibiotic susceptibility of health-care associated MRSA infections in the surgical ICU of the General hospital "Prim. dr. Abdulah Nakaš" Sarajevo.
**Materials and methods:** This study is a retrospective data analysis of the results of microbiological testing of surgical ICU patients in the General hospital "Prim. dr. Abdulah Nakaš" Sarajevo, during the period 01/01/2014 to 10/12/2015. Identification of S.aureus was confirmed by standard methods, and antibiotic susceptibility testing was performed according to the Kirby-Bauer disc diffusion method on Müller-Hinton agar. Oxacillin, cloxacillin, penicillin and cefoxitin were used to test the resistance of isolated S.aureus strains to methicillin. Data were analyzed by methods of descriptive statistics.
**Results and discussion:** Out of the total of 96 nosocomial infections, in 16 cases (16.6%) S.aureus was the identified causative agent, and in 8 (50%) patients it was found to be a methicillin-resistant strain. Among them, 6 patients (75%) were older than 70 years and 2 patients (25%) 55-65 years. MRSA was isolated from sputum in 4 cases and from surgical wound swabs in 5 cases, with one patient having MRSA isolated from both samples. There were no proven MRSA bloodstream infections. Lethal outcome was observed in 3 (37,5%) patients. Every isolated MRSA strain was sensitive to vancomycin, 75% to amikacin, 50% to amoxicillin+clavulanic acid and ampicillin+sulbactam and 25% to ciprofloxacin. All the MRSA isolates were resistant to 3 or more antibiotics tested.
**Conclusion(s):** In our experience, MRSA infections account for half of the nosocomial S.aureus infections, with a 100% sensitivity of the isolated strains to vancomycin and a relative high sensitivity to amikacin.

## 11AP06-6

### Comparison of central venous hemodialysis catheter related infection rates between intermittant hemodialysis and continuous renal replacement therapy for patients requiring renal replacement therapy in medical intensive care unit

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**Background and Goal of Study:** We aimed to compare central venous hemodialysis catheter related infection rates between intermittant hemodialysis and continuous renal replacement therapy for patients requiring Renal Replacement Therapy in medical intensive care unit and the effects on mortality and length of ICU stay.
**Materials and methods:** Retrospective design , single center data on medical intensive care unit patients with sepsis. All adult patients with acute kidney injury who have required extracorporeal renal replacement therapy in whom first central venous catheter is to be inserted by jugular or femoral approach in ICU were included in the study. APACHE II scores, age, sex,duration of catheterization and patient length of stay in ICU were expressed as mean ± standard deviation (SD), clinical and microbiological data to confirm the diagnosis of catheter related infection, catheter duration ,catheter insertion sites and mortality rates were recorded. Patients were followed up with standard practices for renal replacement therapy untill death or discharge.
**Results and discussion:** We studied 105 patients (median age, 66 years; 63% males). The CRRT(continous renal replacement therapy) group had 85 patients and (IHD) intermittant hemodialysis group had 20 patients.The mean Acute Physiology and Chronic Health Evaluation (APACHE II) score was 23.4 in both groups. The rate of catheter related infections were more in CRRT group compered to IHD group( 24/85patients; 28.24 % vs 3/20patients ;15% ).The catheter insertion sites were 22.7% internal juguler vein and 77.3% femoral vein overall. The mean duration of catheterizations were 8.62days for CRRT and 11.3days for IHD. The mean length of stay of patients in ICU were 13.4days for CRRT and 12.6 days for IHD. The mortality rates of patients were 68.2% for CRRT however all the patients were discharged from ICU in the IHD group.
**Conclusion:** Although severity of sepsis were similar between two groups; central venous hemodialysis catheter related infection rate was higher in CRRT group compared to IHD group and was associated with higher mortality and longer ICU stay. This retrospective study was to be first in literature to determine whether IHD decreases the risk of catheter related infection rates compared to CRRT in critical ilness.There needs to be more studies done to compare central venous catheter related infection rates between CRRT and IHD modalities and their effects on mortality in intensive care unit.

## 11AP06-7

### A case report: continuous administration of vancomycin during on-line hemodiafiltration in the hepatic failure patient with staphylococcus bacteremia

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**Background:** VCM is widely used for treatment of gram positive bacteria in hospital patients. VCM can cause adverse effects such as nephrotoxicity and ototoxicity. Therefore, therapeutic drug monitoring is essential for administration of VCM. However, the serum concentration (Cs) change of VCM during extracorporeal blood purification therapy is difficult to predict.
**Case report:** Here we report a patient who received VCM continuously during the on-line high flow rate hemodiafiltration (OL-HDF). The patient was a 17-year-old female with late-onset liver failure. VCM administration was required because of Staphylococcus bacteremia. OL-HDF was performed 12 hours every day.
**Discussion:** To determine the adequate dose of VCM during OL-HDF, we first calculated the clearance (CL) of VCM during OL-HDF by giving a single dose of VCM 1g. The Cs measured at 2 and 3.5 hours after administration of VCM were 58.2 $\mu$g/ml and 12.9 $\mu$g/ml, respectively. Elimination rate constant (K) was calculated as 1.0 = ln (58.2/12.9) / (3.5-2).
The distribution volume (Vd) calculated with the age and weight was 28 L, then CL during OL-HDF was determined as Vd x K = 28 x 1.0 = 28 L/h.
For VCM to be effective, the Cs should be maintained where AUC/MIC was above 400. In this case, the MIC of VCM was 1.0 $\mu$g/ml, the daily VCM dose was calculated as AUC/MIC x Vd = 11200mg, and the dose during the 12 hr OL-HDF (Dvcm) was 5600mg. We predicted that the average Cs (Css) was 16.7 $\mu$g/ml = Dvcm / CL x t. Because we planned to administer VCM continuously for 12 hours during OL-HDF and then discontinue for the next 12 hours, we wished to calculated the Cs of VCM required at the end of OL-HDF which would provide the concentration at the start of next OL-HDF higher than 16.7 $\mu$g/ml.
The Cs of VCM after OL-HDF was measured 8 hours interval (31.3 $\mu$g/ml and 24.4 $\mu$g/ml). Kn was calculated as ln (31.3 / 24.4) / 8=0.031. The Cs at the end of OL-HDF was calculated ≥24.2 $\mu$g/ml by using Kn = 0.031. Finally, the continuous dose of VCM was calculated as 360 mg/h to achieve the Cs of 16.7 $\mu$g/mL at the start of OL-HDF and 24.2 $\mu$g/mL at the end of OL-HDF, and the lowest VCM concentration for each day ranged between 12 and 17 $\mu$g/ml.
**Learning points:** The elimination rate of drug under extracorporeal purification varies greatly, but we could adequately adjust the dose of VCM on the basis of TDM and pharmacokinetic calculations.

## 11AP06-8

### Patient controlled analgesia systems may facilitate cross-infection in Burn Unit?

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**Background and Goal of Study:** Burn necrotic tissue provides optimal conditions for microbial colonization, infection and transmission. The reusable patient-controlled analgesia systems (PCAs) are an effective tool used to relieve pain and in absence of appropriate aseptic conditions, can be a potential source of nosocomial infections by cross-transmission.
The goal of this study was to examine the decontamination efficacy of the PCAs in our Burn Unit and search for possible cross-infection originating in these systems.
**Materials and methods:** During six months (only with knowledge of the authors of this study), samples were randomly collected in PCAs. Two samples swabs were taken of each PCAs: one from the keyboard and another one from the bolus button. A total of 54 (27x2) microbiological samples swabs were collected before the beginning of the PCAs use and 30 (15x2) were collected following PCAs use by the patient. The samples were collected without changing the established cleaning procedures: soap and water followed by 70º alcohol solution and ambient air dying following usage and without further decontamination following PCAs initiation by the patient. Colony microbiological growth of samples where quantified and identified by the Central Laboratory.
**Results and discussion:** Of a total of 84 samples analyzed, 9 samples taken from the bolus button had positive cultures (7 before and 2 after of the use) and 7 samples taken from the keyboard (3 before and 4 after of the use). 14 of these positives cultures showed contamination by commensal bacteria with low pathogenic potential and 2 showed contamination by Staphylococcus aureus (both taken from the bolus button and after of the PCAs use). So, in 19% of PCAs analyzed, bacterial colonization was identified: 16.7% by low pathogenic potential and 2.3% by high pathogenic potential. This contamination may presumably have been due to the cross-infection, causing an increase in morbidity and mortality of patients and treatment costs.
**Conclusion:** Given the high rate of microbial colonization found in PCAs, it is important to review the cleaning and disinfection procedures used. We propose one further measure to the established decontamination procedure that would overcome this possible cross-contamination: daily cleaning and disinfection of the PCAs even when in use. The efficacy of this new decontamination procedure should ideally be revaluated as soon as compliance to this new procedure is established.

## 11AP06-9

### Comparison of APACHE and SOFA scores for survival assessment in sepsis

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**Background and Goal of Study:** APACHE II and SOFA are one of the two most used mortality scores used for critical patients in the ICU. Specifically, SOFA estimates the risk of morbidity and mortality due to sepsis, and APACHE II evaluates mortality risk of patients at ICU admission. The aim of this study is to compare the predictive capability of APACHE and SOFA at 28 days and 90 days after admission.
**Materials and methods:** Prospective observational cohort design. This study was approved by the Clinical Research Ethics Committee of Galicia (Spain). 412 septic patients were recruited and APACHE and SOFA were calculated at admission to the ICU. After logistic regression models, both scores were compared by means of Akaike Information Criterion (AIC) and AUROC (areas under ROC curve) at 28-day and 90-day timepoints from ICU admisssion.
**Results and discussion:** The median APACHE and SOFA scores were 23 and 9 respectively. Mortality in ICU was 34% and 47% in hospital stay. AIC was lower for the APACHE than for SOFA.
**Conclusion(s):** APACHE II score seems to perform slightly better than SOFA in our patients However, such small difference doesn't support SOFA to be replaced in the clinical setting, as the method for its calculation is simpler and allows for repeated measurements.

| SCORE | AIC 28 days | AIC 90 days | AUROC 28 days | AUROC 90 days |
|---|---|---|---|---|
| APACHE II | 362.7 | 427.3 | 0.72 | 0.72 |
| SOFA | 374.3 | 435.4 | 0.71 | 0.71 |

*[Goodness of fit comparison between APACHE and SOFA]*

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## 11AP06-11

### APACHE II, SOFA and SAPS II scoring systems in assessing survival of critically ill ICU patients

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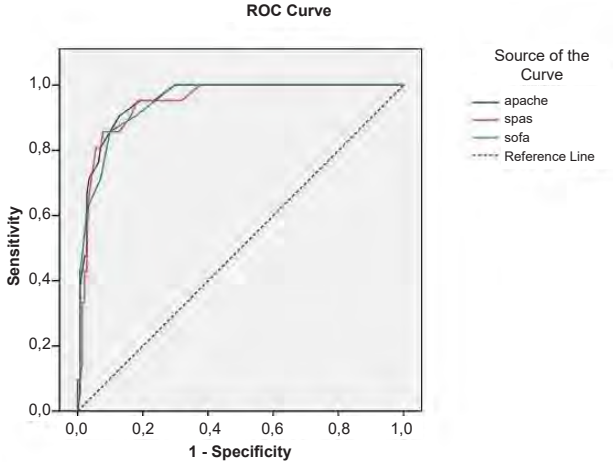
**Background and Goal of Study:** Improved mortality prediction for patients in intensive care units is a big challenge. Many severity scores have been proposed, but findings of validation studies have shown that they are not adequately calibrated. To compare the predictive ability of the most widely used scoring systems (Acute Physiology and Chronic Health Evaluation [APACHE] II, Simplified Acute Physiology Score [SAPS] II, and Sequential Organ Failure Assessment [SOFA]) for clinical outcome in patients with respiratory failure after noncardiac surgery.
**Materials and methods:** Consecutive patients admitted to a noncardiac surgical intensive care unit (CSICU) were retrospectively studied. Data on the preoperative condition, intraoperative parameters, and postoperative course were collected. The ability to predict group mortality by the SOFA score, APACHE II score, and SAPS II method was assessed using two by two decision matrices and receiver operating characteristic (ROC) curve analysis.
**Results and discussion:** A total of 181 patients (mean age ; 62.7 ± 17.4 yr, Male; 98 (%54.1), Female; 83 (%45.9) were enrolled. The areas under the curve in the ROC curve (AUROC, Figüre 1.) analysis for the SOFA score, APACHE II scoring system, and SAPS II were 0.948, 0.954, and 0.946, respectively. AUROC APACHE II is only slightly higher than the other 2 AUROC incipient scoring systems. The cut-off value were 18.5 APACHE II (sensitivity 90%, specificity 87% ), 38.5 SAPS II (sensitivity 90%, specificity 84%), 4.5 SOFA (sensitivity 90%, specificity 82%) respectively. A strong correlation between APACHE II and SAPS II was found in this study. ($p < 0.01$).
**Conclusion:** The SOFA, APACHE II, and SAPS II have different capability to discriminate and estimate early in-hospital mortality of patients. The APACHE II score and SAPS II score are more useful in predicting mortality, and easier and simpler than the SOFA Score.




*[The areas under the curve in the ROC curve]*

## 11AP07-1

### Intra-pleural fibrinolytic therapy in a patient with fibrotic tracts in pleural effusion observed in lung sonography but not in tomography scan

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**Background:** Lung sonography (LS) is a valuable tool in the management of acute respiratory failure (ARF) in critical care units. LS can diagnosis several lung abnormalities, modify the initial diagnosis and determinate therapeutic changes. Besides, LS has demonstrated to be superior to chest radiography in several points with A and B grades of scientific evidence, but thoracic Tomography Scan (TC) is still considered to be the gold standard in pulmonary diagnosis.
**Case Presentation:** In this report, we presented a case of postoperative ARF with admission to ICU criteria. Large left pleural effusion was evident in chest x ray studies. Non-invasive mechanical ventilation (NIMV) was applied with response, but the patient kept needing this therapy to maintain good parameters of oxygenation and ventilation. A chest tube drainage was punctured with the aim of improving the NIMV weaning. In the first two hours, 700ml of amber liquid with transudate characteristics were obtained. In an x ray control study, an image of whole white left lung similar to the previous one was obtained. The chest tube was well placed but it did not drain anymore. A thoracic CT scan was solicited; a septated or loculated pleural effusion was ruled out. Nevertheless, fibrotic tracts were evident in pleural effusion during a systematic lung sonography exploration. According to these results, we proceeded to apply intra-pleural fibrinolytic therapy. More than 2000ml were drained in the first four hours, with improvement in radiological studies and allowing NIVM removal.
**Discussion:** As reflected in the International evidence-based recommendations for point-of-care lung ultrasound, chest sonography could be a more sensitive test than TC; for example regarding to pleural effusion characteristics. We think this point is a novel approach in clinical management of ARF because we would not have used intra-pleural urokinase only with CT scan results.
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**Learning points:** Utility of Lung Sonography in Critical Care

## 11AP07-3

### Blockade fibroblast growth factor inducible 14 on pulmonary vascular endothelial cells attenuated acute lung injuries induced by cecal ligation and puncture via modulating infiltration of inflammatory cells

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**Background and Goal of Study:** Pulmonary vascular endothelial cells (PVECs) are principal targets of the overwhelming systemic inflammation during the progression of acute lung injury induced by sepsis. Fibroblast growth factor inducible 14 (Fn14) participate in the kinds of immune related diseases. However, the relationship between the permeability of pulmonary vascular endothelial cells and Fn14 variation is still poorly understood. In this study, we want to investigate the possible effects of Fn14 expressed on PVECs and explore the pontentail mechanisms.
**Materials and methods:** 1. The expression of Fn14 on the PVECs were measured 24 h after cecal ligation and puncture (CLP) surgery. The protective effects of Fn14 neutralizing antibody on lung injury were determined via assessing the protein concentration in the bronchoalveolar lavage fluid (BALF), lung W/D ratio, the H&E staining and the counts of inflammatory cells in the lung tissues. The expression of ICAM-1 and MCP-1 on the PVECs of lung tissues were determined to explain the infiltration of immune cells. Additionally, we also measured the TEER and ICAM-1 and MCP-1 expression to assess the protective roles of Fn14 in human pulmonary vascular endothelial cell culture conditions via siRNA interference.
**Results and discussion:**
1. At 24 h after CLP surgery, the expression of Fn14 on PVECs was significantly higher in CLP group than sham group.
2. Fn14 neutralizing antibody were administrated 3 h after CLP surgery, the BALF and lung tissues were harvested 24 h after surgery. Compared with sham group, Fn14 neutralizing antibody reduced the protein concentration in the BALF, decreased the W/D ratio of lung tissues, attenuated the infiltration of neutrophils and monocytes, and eventually alleviated the damages of lung tissues. Fn14 neutralizing antibody downregulated the levels of ICAM-1 and MCP-1 expression on the PVECs.
3. In human pulmonary vascular endothelial cell culture conditions, knockdown Fn14 reduced the expression of ICAM-1 and MCP-1 and increased the levels of TEER when stimulated with LPS and TWEAK.

**Conclusion(s):** Fn14 expression on the PVECs could upregulated when mice subjected to CLP. Fn14 neutralizing antibody could play an protective role in lung injuries via modulating the ICAM-1 and MCP-1 expression on the PVECs and eventually reduced the infiltration of neutrophils and monocytes during the progress of sepsis induced by CLP.

## 11AP07-4

### The effect of angiotensin-(1-7) to experimental acute lung injury rat

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**Background and Goal of Study:** Acute lung injury (ALI) was common in operative theatre and intensive care unit while still with 30-40% mortality. The rennin-angiotensin system played an important role in the pathogenesis of ALI, the overexpression of angiotensin II in RAS contributed to the pathogenesis of inflammation. As a natural antagonist of angiotensin II, angiotensin-(1-7) may block the effects of Ang-II. This study was aimed to evaluate the potential for Ang-(1-7) to reduce lung injury, inflammation in an experimental model of ALI.
**Materials and methods:** LPS (0.2mg/kg) was given to the Sprague Dawley rats (male) by i.v. which were also suffered the high ventilation (10ml/kg) for 4h in acute lung injury study, and then the rats were randomized to receive an intravenous infusion of either Ang-(1-7) (50pmol/kg/min), the antagonist of Ang-(1-7) (AVE0991, 500pmol/kg/min), the agonist D-pro-Ang-(1-7) (100pmol/kg/min) or vehicle (saline), starting simultaneously with injury till 2h afterwards. Mean artery pressure and pulmonary artery pressure were recorded during the 2h, artery blood gas analysis was also collected at the same time, bronchoalveolar lavage (test of MPO) and hematoxylin-eosin staining of the lung tissue were performed to assess the injury. The counts of white blood cells from peripheral blood was measured to access the inflammatory.
**Results and discussion:** In this study, Ang-(1-7) and its' agonist D-pro-angiotension-(1-7) led to a significant improvement in MAP while reduction in PAP in both groups but without any statistical difference, compared to AVE0991 ($p<0.05$, two-way repeated measures ANOVA). There's no difference of PaO2 among the four groups, MPO in BAL was less in Ang-(1-7) and D-pro-angiotension-(1-7) groups. Worst injury was found in AVE0991 group from the HE staining of the lung tissue, the white blood cells counts reduced with the treatment of Ang-(1-7 ) and D-pro-angiotensin-(1-7).
**Conclusion:** Ang-(1-7) played an protective role in acute lung injury while further study still needed to confirm the precise dose.

## 11AP07-5

### Cytokines (IL- 15, MIP-1a) vs PAI- 1 in developing acute respiratory distress syndrome

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**Background and Goal of Study:** The crucial role in developing ARDS plays inflammatory process. The crosstalk between lung inflammation and fibrinolytic pathways described. Inflammation modulates blood coagulation which stimulates cells to produce tissue plasminogen activator inhibitor-1 (PAI-1). Cytokines as well as fibrinolysis biomarkers can be useful to predict mortality in patients at risk of developing ARDS.
The main goal of this study was to investigate the dynamic changes in the activity of interleukin IL-15, macrophage inflammatory protein 1a (MIP-1a) and fibrinolysis marker PAI-1 in patients with and without ARDS. The secondary goal was to determine the relationship of the level of cytokines and PAI-1 to the outcome.
**Materials and methods:** This prospective study was conducted in the ICU of Pauls Stradiņš Clinical University hospital during year 2015. Patients with acute severe pneumonia, pancreatitis, sepsis were included. Patients were monitored for seven days. The ARDS was diagnosed according to the Berlin definition criteria. Blood samples we took at the first- T1 and fourth- T4 after inclusion. IL-15 and MIP-1a were measured using cytokine array kit (Randox Evidence). Plasma biomarker of fibrinolysis (PAI-1) was measured with ELISA.
**Results and discussion:** After ethical approval, 40 critically ill patients with a mean age 56 ± 18 years (12 (30%) sepsis, 18 (45%) pneumonia, 10 (25%) pancreatitis) on mechanical ventilation at least for 24 h due to respiratory failure were studied. ARDS developed in 16 patients (7(44%) mild, 5 (31%) moderate, 4 (25%) severe). Mean values of IL-15 were consistent between patients with and without developing ARDS (2.6± 0.26 pg/ml; p= 0.004 vs 2.34 ± 0.32 pg/m;l p=0.002) with no significant dynamic changes between day 1 and day 4. MIP-1a was significantly higher in patients with ARDS at $T_1$ 20.3 ± 3.46 pg/ml; p=0.009 vs 7.08 ± 0.89 pg/ml; p=0.004 respectively. Moreover, comparing not survivors (n = 7) vs survivors significantly higher values were noticed for MIP-1a at $T_1$ 23.13 ± 1.21 pg/ml; p=0.01 vs 17.63 ± 2.67 pg/ml; p=0.007 respectively. PAI-1 shown significant difference in patients with ARDS if compare with those without ARDS at $T_4$ (89 ± 31 pg/ml; p = 0.009 and 45 ± 30 ng/ml; p = 0.005).
**Conclusions:**
1. There are dynamic changes in the level of MIP-1A and PAI-1 in patients with ARDS.
2. Increased level of MIP-1a at the first day after inclusion related with the poor outcome in ARDS patients.

## 11AP07-6

### High frequency oscillatory ventilation (HFOV), is there still a room for it?

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**Background:** Since the publishing of the OSCAR and OSCILLATE trials the use of HFOV has declined rapidly, especially with these trials suggesting no decrease and even increased mortality. We think that there's still a room for it, as we present a case of refractory hypoxaemia due to pulmonary haemorrhage managed successfully using HFOV in a general district hospital.
**Case report:** A 59 year old female admitted with a history of general fatigue, malaise and non-specific abdominal pain. She was noted to be pale, breathless, pyrexial and had moderate tachycardia (93 beats/minute).
A recent abdominal ultrasound scan had revealed an intrauterine mass (presumed to be a fibroid). Initial blood tests revealed severe anaemia and moderately elevated total white cell count. She received 4 units transfusion of red cells and had a contrast-enhanced CT scan of chest, abdomen and pelvis. At that point she developed a shunt and required oxygen at low inspired concentrations (via nasal cannula) to maintain normal oxygen saturations.
By day 4, her shunt worsened and respiratory distress became evident (40 breaths/minute) associated with haemoptysis of frank blood. She was hypoxic achieving 83% saturation with $O_2$ flow 15L/min via non-rebreather mask.
After intensive care admission and due to progressive hypoxia, patient was sedated and mechanically ventilated using BIPAP/ASB mode. Despite frequent recruitment manoeuvres and moderate PEEP settings, the maximum achieved $pO_2$ (on $FiO_2$ of 1.0) was 13 kPa and she continued to desaturate precipitously between these rescue attempts. It was decided to attempt HFOV.
Despite the persistence of the shunt, the HFOV allowed the stabilisation of the $O_2$ requirement and return to conventional ventilation around 96 hours post-intubation. Diagnosis confirmed as Wegener's granulomatosis with pulmonary haemorrhage, patient made full recovery.
**Discussion:** Pulmonary haemorrhage is a common complication of autoimmune vasculitis. Evidence shows HFOV benefit in pulmonary haemorrhage in children, interestingly with little evidence in adults. We believe that the HFOV physical tamponading effect can be lifesaving in such cases.
**Conclusion:** HFOV remains an important rescue strategy in refractory hypoxaemia. Despite not showing benefit in ARDS patients, it still can do in other subgroups with different pathology and that creates the need to identify these subgroups.

## 11AP07-7

### Airway driving pressure in ARDS patients. Any relationship with lung stress?

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**Background and Goal of Study:** The current recommendation for ventilatory treatment in ARDS patients includes the use of low tidal volume with moderate to higher levels of PEEP. This strategy should minimize the lung stress/strain and the opening and closing trauma. However in ARDS patients due to the presence of lung disease, the same tidal volume can distribute very differently in the remaining lung volume generating stress/strain. A possible solution should be to evaluate the airway driving pressure (i.e. the pressure generated for a given tidal volume normalized for the compliance of the respiratory system). Amato, hypothesizing that airway pressure driving is an adequate surrogate of the lung strain, showed that airway driving pressure was significantly related to outcome.[1] However due to the presence of alterations in chest and lung elastance the same inspiratory airway pressure can be generated by different tidal volume. Consequently the transpulmonary driving pressure should better reflects the stress/strain.[2]
Aim of this study was to evaluate the relationship between airway and transpulmonary driving pressure in a group of sedated and paralyzed patients at different PEEP level and to evaluate the accuracy of airway driving pressure to estimate the lung stress.
**Materials and methods:** 91 sedated and paralyzed ARDS patients were enrolled (mean age 61±16 years, body mass index 27.1±6.5 Kg/m$^2$, $PaO_2/FiO_2$ 176±61, PEEP 11.8±3.2 cm$H_2O$, tidal volume 8.1±2.6 mL/Ideal Body Weight). Airway and esophageal pressure were recorded to estimate the lung stress, airway and transpulmonary driving pressure.[1,2] A lung stress of 26 cm$H_2O$ was considered the upper limit to minimize the ventilator induced lung injury.
**Results and discussion:** The transpulmonary driving pressure was significantly related to the airway driving pressure ($r^2$=0.79, p<0.0001, figure 1). However, the transpulmonary driving pressure was better related to the total lung stress compared to airway driving pressure ($r^2$=0.48, p<0.0001; $r^2$=0.35, p<0.0001 figure 2,3). The sensibility and specificity of airway driving pressure to predict a lung stress higher than 26 cm$H_2O$ were 0.66 and 0.92 at 15 cm$H_2O$, respectively.
**Conclusion:** The airway driving pressure can not adequately predict the lung stress, due to the different alteration in lung and chest wall elastance among ARDS patients.
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## 11AP07-8

### Respiratory support in patients with multitrauma complicated by acute respiratory distress syndrome

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**Background and Goal of Study:** Improve the methods of mechanical ventilation in therapy of multitrauma and damage of thoracic cage and lungs complicated by acute respiratory distress syndrome (ARDS).
**Materials and methods:** 262 patients with multitrauma and damage of thoracic cage admitted to Research Center of Emergency Medicine from 2010 to 2014. Mean age was 34±2. The main criterion to include in the study was multitrauma with: damage of thoracic cage and lungs; complicated by hemo- and pneumothorax; fracture of more than four ribs; respiratory failure of I and II degree; Glasgow coma scale less than 9; decrease PaO2/FiO2 fraction more than 200; presence of damages of skeletal system on radiological examination.
Patients were divided into two groups: 1st group - 134 patients to whom mechanical ventilation was carried on in IPPV mode; 2nd group - 128 patients to whom mechanical ventilation carried on in combination of BIPAP and HFV by catheter. All data (PaO2, PaCO2, SaO2, PaO2/FiO2, C) were registered during the mechanical ventilation, 10-15 minutes after admission to the intensive care unit, after 6, 12, 24 hours and every day.
**Results and discussion:** APACHE II score on the 1st day was 21 on average, and supposed mortality was 68.5%. Murray's scale of pulmonary damage>2.5, PaO2/FiO2 <200, PaO2<60 mmHg and radiological signs of pulmonary edema indicated ARDS. Baseline indices are shown in Table 1.

| | 1st group | 2nd group |
|---|---|---|
| ABG PaO2 (mmHg) | 59±1.1 | 66±1.3 |
| ABG PaCO2 (mmHg) | 37.0±1.7 | 39.4±1.5 |
| Compliance (C) (ml/cmH2O) | 38.5±1.1 | 38.2±1.7 |
| PaO2/FiO2 (mmHg) | 198±1.4 | 121±11.5 |
| SaO2 (%) | 90±1.2 | 90.5±3.2 |

*[Table 1. Baseline indices]*

One can see significant improvement of ABG, saturation and shunt decrease in BIPAP mode ventilation. Oxygenation index was 178.5±4.5. Its improvement is shown in Table 2.

| Baseline | 178.5±4.5 |
|---|---|
| After 2 hours | 219.5±10.1 (23%) p<0.01 |
| After 6 hours | 202.8±13.1 |
| After 12 hours | 210.8±20.3 |
| After 24 hours | 233.3±10.7 (30.7%) p<0.01 |
| After 48 hours | 270.1±13.3 (51.7%) p<0.001 |

*[Table 2. Oxygenation index]*

Respiratory support duration was 7.1±1.2 days, 2nd group - 14.9±2.6 days (p<0.01).
**Conclusion(s):** After the application of BIPAP mode with catheter regimen by HFV, spontaneous breathing of the patient improves external respiration, hemodynamics and ABG.

## 11AP07-9

### Comparison of mortality prediction models in acute respiratory distress syndrome (ARDS) with extracorporal membrane oxygenation and development of a novel prediction score

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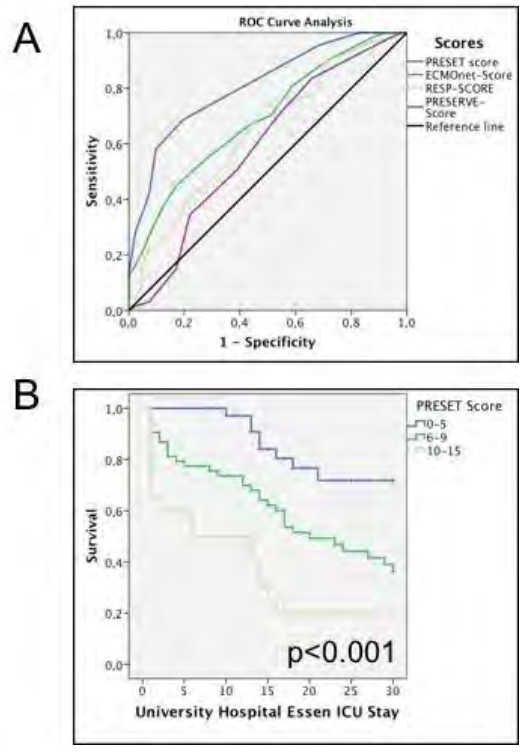
**Background and Goal of Study:** Extracorporeal membrane oxygenation (ECMO) is a life-saving therapy in ARDS patients but associated with complications and increased costs. In our study we validate various scores supposed to predict mortality and develop a more reliable optimized categorical model.
**Materials and methods:** Data from our ICU (108 patients receiving veno-venous ECMO;2010-2015) were retrospectively analysed. Values of variables were collected pre-ECMO. Established risk scores (ECMOnet-, RESP-, and PRESERVE-Score) were assessed for their usefulness to predict mortality, univariate analysis was used to define variables associated with mortality, and logistic regression analysis identified variables independently associated with mortality. Categorization of these variables resulted in the novel score, i.e., the PREdiction of Survival on ECMO Therapy-Score (PRESET-Score).
**Results and discussion:** The median [25;75% Quartile] Sequential Organ Failure Assessment (SOFA) was 14 [12;16] and the Simplified Acute Physiology Score II (SAPS II) was 62.5 [57;72.8]. Median length of hospital stay was 17 days [range:1-124] and mortality was 62%. Only the ECMOnet- (area under the curve (AUC): 0.69, 95%CI: 0.59-0.79; p=0.001)) and the RESP-SCOREs (AUC 0.64 (95%CI: 0.54-0.75)) predicted mortality (fig. 1A). Pre-ECMO pHa, mean arterial pressure, lactate and platelet concentrations, and pre-ECMO hospital stay were identified as independent predictors of mortality and categorization resulted in values (PRESET-Score) between 0-15 with an AUC of 0.81 (95%CI: 0.73-0.89; p<0.0001; fig. 1A). A cut-off value of 5.5 resulted in a sensitivity of 0.82 and a specificity of 0.56 (odds ratio: 5.9; 95%CI:2.4-14.1; p<0.001). Thirty-day survival was 72, 37, and 20% for PRESET-Scores of 0-5, 6-9, and 10-15 (p<0.001 log-rank, fig. 1B), respectively.




*[ROC-Analysis]*

**Conclusion(s):** While our data confirm that the ECMOnet and RESP-scores predict mortality in ECMO treated ARDS patients, we propose a novel model also incorporating extrapulmonary variables, the PRESET-Score. This score better predicts mortality and, therefore, appears a better choice for decision support in ARDS patients to be placed on ECMO.

## 11AP07-10

### Predicting survival after veno-arterial-ECMO: first external validation of the SAVE-score

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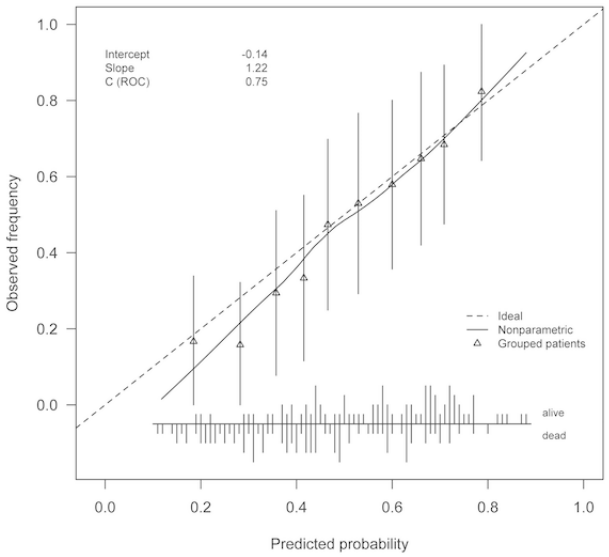
**Background and Goal of Study:** Veno-arterial-extracorporeal membrane oxygenation (ECMO) is an efficient approach in the management of refractory cardiogenic shock. The recently published SAVE-score was designed as a tool to predict in-hospital survival in patients receiving ECMO for refractory cardiogenic shock [1] .
Our objective was to externally validate the SAVE-score in a new dataset, to support its clinical application.
**Materials and methods:** After institutionnal approval, data from every patients receiving veno-arterial-ECMO primarily for cardiogenic shock between January 2005 and December 2014 were extracted from our local single-center prospectively-maintained cardiac surgery database. Using the original publication exclusion criteria, SAVE-score calculation was performed for each patient, omitting individuals with missing data. Discrimination was assessed using the area under the receiver operator characteristic curve (AUC). Calibration was evaluated with the Hosmer-Lemeshow goodness-of-fit test and calibration plot. Slope and intercept values were calculated using logistic regression.
**Results and discussion:** We included 303 patients receiving ECMO. Using only complete data, SAVE-score calculation was perform in 180 patients. Overall in-hospital survival in complete-case analysis was 46.7 % and did not differ from missing-data group (43,9 %, p=0.63). The SAVE-score discriminated survivors and non survivors with an AUC of 0.746 (95% CI 0.674 to 0.817, p= 0.05), demonstrating good discriminatory performance. P value from Hosmer-Lemeshow goodness-of-fit test was 0.98 indicating no evidence of poor calibration. However, calibration plot analysis (Fig. 1) revealed both underfitting (calibration slope = 1,22) and overestimation (intercept = -0,14) resulting in predicted survival rates not varying enough and being systematically too high.




*[Calibration plot of SAVE-score]*

**Conclusion(s):** External validation of the SAVE-score in our independant cohort revealed good discriminatory performance and acceptable calibration. However, model updating by recalibration might be necessary before clinical application.
**Reference:**
1. Schmidt M, Burrell A, Roberts L, et al. Eur. Heart J. 2015;36:2246-2256.

## 11AP07-11

### Do procalcitonin levels rise after lung transplantation with extracorporeal circulation?

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**Background and Goal of Study:** Procalcitonin (PCT) is a propeptid of calcitonin produced by C-cells of the thyroid gland and cleaved intracellularly by proteolytic enzymes. It is undetectable in healthy people and rises in systemic inflammatory response syndrome (SIRS) as an acute-phase protein, making it useful for early diagnosis of inflammatory disorders and infections. The reasons for SIRS following extracorporeal circulation (ECC) are not yet fully understood. We investigated PCT values as a biomarker of inflammation in lung transplantation patients with or without ECC.
**Materials and methods:** Of 104 patients that were transplanted in our center since 2008, 41 used ECC; one of them died in the theater because of an aortic dissection and two of them were transplanted before procalcitonin protocol started (group A, n=40). We compared the PCT levels on the first 72 hours, determined daily (PCT 1: 24hs - PCT 2: 48hs - PCT 3: 72hs), of these patients with 40 patients who received lung transplant without ECC during the same period (Group B).
**Results and discussion:** 37 patients of group A and 19 of group B were bilateral lung transplants. From the 40 patients of group A, 27 used conventional or modified ultrafiltration (UF), 11 did not use it and there were no data for the rest. In group A, the average PCT 2 level was 7,50 ng/ml (95% CI: 3,4-11,6; SD: 18,3) while in group B was 1,30 ng/ml (95% CI: -2,9-5,5; SD: 2), with significant difference (t student, p= 0,039). No relation was observed between ECC's duration and PCT levels. The variation of PCT levels during the first three days after lung transplantation is more evident between the first 48 and 72 hours in both groups (Paired t Test, p=0,021 group A, p=0,013 group B). PCT levels of bilateral lung transplants showed no significant difference between groups (t student, p p>0,05). PCT levels with or without ultrafiltration after ECC show no statistical significant differences (t student, p>0,05).
**Conclusion(s):** PCT levels rise after the use of ECC as an inflammatory biomarker, but this raise is not influenced by the duration of it. More studies with other biomarkers are needed to determinate if this raise may influence the antibiotic treatment after lung transplantation.

## 11AP08-1

### Cerebral inflammation is modulated by aseptic isolated lung injury in a porcine model

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**Background and Goal of Study:** Bacterial pneumonia is known to cause remote inflammation in peripheral organs. But it still is unclear, if this crosstalk is caused by bacterial proteins. Furthermore it remains to be elicited to what extend the brain is affected by this crosstalk and if the blood-brain barrier is a sufficient protection.
We hypothesized that even an aseptic isolated inflammation of the lung would lead to an increase in cerebral inflammation and to morphologic changes of the hippocampus.
**Materials and methods:** After approval of the state and institutional animal care committee we performed the study according to international guidelines for the care and use of laboratory animals. 20 anaesthetized pigs were randomized to three groups: either ARDS by injection of oleic acid (n=8), control (n=8) or native (n=4). Animals of the ARDS- and control-group were kept under general anaesthesia for 18 hours and treated according to a standard protocol. Post-mortem the brain was examined histopathologically and the cerebral mRNA-expression of inflammatory key markers was analysed by real-time PCR. The results were compared by applying one-way-ANOVAs with post-hoc correction for multiple-testing.
**Results and discussion:** The histopathologic examination showed no significant difference in the number of neurons or activated microglia in the hippocampus. The mRNA-expression analysis of the brain showed a significant increase of TNF-alpha and IL-6 in the hippocampus ($p<0.05$), there was no significant difference in cerebral cortex. Further cytokine (IL-8) and enzyme expressions (iNOS) in the cerebral cortex or hippocampus did not differ between the groups.
**Conclusion(s):** It can be concluded that even an aseptic, isolated damage to the lung modulates the expression of inflammatory cytokines in the brain. As increased cerebral levels of inflammatory cytokines are associated with cerebral dysfunction[1], the present data suggest an important role of mechanical lung injury as putative trigger for neurocognitive dysfunction.
**Reference:**
1. Clark IA et al. The roles of TNF in brain dysfunction and disease. Pharmacol Ther. 2010 Dec; 128(3): 519-48

## 11AP08-2

### Inhibition of cannabinoid 2 receptor in mice with CNS-injury induced immunodeficiency syndrome (CIDS)

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**Background and Goal of Study:** Patients after acute CNS injury have a high risk for an infection due to post-injury disturbance of the normally well-balanced interplay between the immune system and the CNS, resulting in systemic immunosuppression. This dysregulation has been termed CNS injury-induced immunodeficiency syndrome (CIDS).
The endocannabinoid system (ECS) is composed of endocannabinoids, specific receptors and metabolizing enzymes, and is involved in key homeostatic functions in the CNS and the immune system. It is suggested that local up-regulation of the ECS occurs following CNS injury and represents an adaptive mechanism. Cannabinoid type 2 receptors (CB2R) are expressed in higher levels on microglia and peripheral immune cells and is shown to have an immunosuppressive role, suggesting that the activation of CB2R contributes to the immunosuppression in CIDS. We propose that the immunosuppression can be reversed by inhibition of CB2Rs on immune cells with a specific CB2R antagonist, such as AM630.
**Materials and methods:** CNS injury was induced in C57Bl/6 mice (male, 6-8 weeks) via an intracerebral injection of the vasoconstrictor peptide, endothelin-1 (ET-1, 2$\mu$g/$\mu$l). Immune response to lipopolysaccharide (LPS) challenge was assessed 24 hr later using intravital microscopy within the intestinal microcirculation. The brain tissue was extracted and stained with tetrazolium chloride (TTC) to confirm CNS injury. The effect of genetic CB2R knockout on the severity of CIDS was also assessed.
**Results and discussion:** Consistent with the induction of CIDS, intravital microscopy confirmed that immunochallenged animals with CNS injury have a reduced count of activated leukocytes within the intestinal microcirculation when compared to immunochallenged animals without CNS injury. AM630 (2.5 mg/kg, i.v.) administration 15 min prior to LPS challenge, reversed this measure of suppressed immune function and did not have any detrimental impact on the infarct size. Genetic knockout of CB2R revealed that the CIDS was not induced after an acute CNS injury, confirming the involvement of the ECS in CIDS.
**Conclusion(s):** Our findings suggest that inhibition of the CB2R pathway after an acute CNS injury reverses CIDS without exacerbating the brain injury. Further studies will focus on investigating various treatment time points, measuring inflammatory markers as well as pharmacologic confirmation of endocannabinoid pathway involvement.
**Acknowledgements:** Heart and Stroke Foundation

## 11AP08-4

### Management of a rare case of new onset refractory status epilepticus in a district general hospital

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**Background:** New onset refractory status epilepticus(NORSE) is status epilepticus which has continued or recurred despite general anaesthetic for 24 hours or more. The infrequency with which it is encountered and limited evidence base available for treatment strategies make it a formidable management challenge.
**Case report:** A 29 year old lady developed refractory generalized seizures requiring admission to intensive care and administration of general anaesthetic. EEG was continuously monitored, intravenous infusions of anaesthetic induction agents and benzodiazepines were used in an attempt to maintain a burst suppression pattern or electrographic silence while antiepileptic medications were titrated to therapeutic ranges. CT, MRI, CSF examination and serological test for various infectious, autoimmune and toxic aetiologies were normal. Ketamine infusion, hypothermia, Trans Cranial Electro Magnetic Stimulation, Immunoglobulins and steroids, Ketogenic diet were attempted as seizures remained refractory. Short duration burst suppression was evident with some treatment modalities but none showed sustained effect. Attempts to wean anaesthetic drugs were met with recurrence of electrographic and clinical seizures. After 46 days she was transferred to a tertiary centre where she had further MRI, PET scan, brain and muscle biopsies, mitochondrial and POLG sequencing, enzyme assays but no cause was identified. Plasma exchange was attempted. Her stay was complicated by prolonged Burkholderia Gladioli sepsis. Sedation was gradually weaned off after 63 days(despite periods of worsening EEG with assumption that it was ineffective).
Six months later her seizures gradually improved and currently she has around 10-15 brief clinical focal seizures per day, is alert, interacts with environment, haemodynamically stable and is making excellent progress on the rehabilitation ward.
**Discussion:** In this case NORSE was the presenting feature; no recognisable aetiology was ever identified. A review article published by Simon etal(1) outlines multiple treatment approaches, most of which were attempted at the district general hospital.
**Reference:**
1. Simon shorvon et al: Brain2011:134;2802-2818.
**Learning points:** This case report emphasises the fact that good recovery can occur after weeks or months of SE especially in cases where no cause has been identified. Hence it is of paramount importance that therapy is continued and premature withdrawal of care is not contemplated.

## 11AP08-5

### Evaluation of deep-forehead temperature (SpotOn®) during therapeutic mild hypothermia and rewarming

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**Background and Goal of Study:** Therapeutic mild hypothermia (TMH) is an established treatment following cardiac arrest, and the measurement of core body temperature during the treatment is important. Although blood temperature has been accepted as the gold standard for measuring core temperature, it requires an invasive procedure. A recently developed thermometer, SpotOn® (3M, St. Paul, MN, USA), measures deep-forehead temperature (Tdf) as the core temperature in a noninvasive manner[1)], but its accuracy during TMH has not yet been evaluated. The aim of this study was to compare temperatures measured in the pulmonary artery (Tpa) and/or urinary bladder (Tbl) using Tdf during TMH.
**Materials and methods:** We retrospectively studied four post-cardiac arrest patients who had undergone TMH. We cooled each patient's core temperature to 35°C-36°C and maintained it for 24 h using the Arctic Sun 2000® targeted temperature management system (Medivance Inc., Louisville, CO, USA). Rewarming was performed at a rate of 0.05°C/h until the core temperature reached 37°C. To monitor the patients' core temperatures, we measured Tpa in two of four patients, and Tbl and Tdf for all four patients. All the temperatures were recorded at 1-min intervals. We considered Tpa/Tbl as the reference values and compared Tdf to them using Bland-Altman analyses. We determined an accuracy of 0.5°C to be clinically acceptable.
**Results and discussion:** The four patients were all male (mean age, 63.8 years, range 45-79 years; mean weight 74.6 kg, range 67.1-86 kg; mean height 165.5 cm, range 159.6-170 cm). The durations of measurement of TMH/rewarming were 811/1152 min, respectively. A total of 7852 value points were analyzed. Tpa/Tbl ranged from 35.1/34.8°C to 37.5/37.4°C, respectively. The mean average difference between Tdf and Tpa (i.e., Tdf minus Tpa) was −0.03°C (95% limits of agreement: ±0.10; 99.9% of the differences were ≤0.5°C). The mean average difference between Tdf and Tbl was −0.01°C (95% limits of agreement: ±0.08; 98.0% of the differences were ≤0.5°C).
**Conclusion:** We conclude that Tdf has clinically sufficient accuracy during TMH and rewarming. Its accuracy was not inferior to that of Tbl.
**Reference:**
1. Yashar Eshraghi. Anesthesia and analgesia 119(3): 543-49 (2014)
**Funding:** This study was not funded by any grant.

## 11AP08-6

### Venous cerebral congestion impairs cerebral oxygenation and is associated with worse outcome in post-cardiac arrest patients

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**Background and Goal of Study:** Post-cardiac arrest (CA) patients are at risk for secondary ischemic damage in case of suboptimal brain oxygenation during ICU stay. We hypothesized that elevated central venous pressures (CVP) would impair cerebral perfusion and oxygenation ('venous cerebral congestion').
The aim of this study was to investigate the relationship between CVP, cerebral tissue oxygen saturation ($SctO_2$) as assessed with near-infrared spectroscopy (NIRS) and outcome in post-CA patients.
**Materials and methods:** A prospective, observational study was performed in 48 post-CA patients during therapeutic hypothermia (TH; 24 hours at 33°C, followed by rewarming at 0.3°C/h over 12 hours). $SctO_2$ using FORE-SIGHT™ technology (CAS Medical systems, Branford, CT, USA) and CVP were continuously monitored. Multivariate logistic regression models were constructed to describe interactions between MAP-CVP and cardiac output (CO)-CVP as determinants of $SctO_2$. The percentage of time above each CVP value (range 0-25mmHg) was calculated per patient and odds ratios were determined to assess the association between the time above each CVP value and the odds to survive with good neurological outcome (CPC 1-2).
**Results and discussion:** We found a strong negative correlation between CVP and mean $SctO_2$ ($SctO_2$= -0.13xCVP+67.21%, $R^2$ 0.62, n=1 949 108 data points). Multivariate linear regression revealed high CVP to be a more important determinant of $SctO_2$ then low MAP without an important interaction between both ($SctO_2$=0.01xMAP-0.20xCVP+0.001xMAPxCVP+65.55%). CVP and cardiac output were independent determinants of $SctO_2$ with some interaction between both ($SctO_2$=1.86xCO-0.09xCVP-0.05xCOxCVP+60.04%). Logistic regression revealed that a higher percentage of time with a CVP above 5mmHg was associated with a lower chance to survive with good neurological outcome at 180 days (OR 0.96, 95% CI 0.92-1.00, p=0.04).
**Conclusion(s):** Elevated CVP's seem to result in lower brain saturations and are associated with worse outcome in post-CA patients. This pilot study provides for the first time strong evidence that venous cerebral congestion may be detrimental for post-CA patients.

## 11AP08-7

### Outcome prediction in out-of-hospital cardiac arrest patients using near-infrared spectroscopy

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**Background and Goal of Study:** Despite recent advances in cardiopulmonary resuscitation and post-resuscitation care, post-anoxic neuronal injury still remains the major cause of mortality in patients admitted after out-of-hospital cardiac arrest. Near infrared spectroscopy provides bedside real-time information on frontal brain oxygenation by measuring the regional cerebral oxygen saturation ($SctO_2$). The aim of the study was to monitor $SctO_2$ for 48 hours in OHCA patients during targeted temperature management (TTM).
**Materials and methods:** A prospective, observational study was performed during TTM at 33°C in 107 OHCA patients. $SctO_2$ was continuously monitored using the FORE-SIGHT™. The Cerebral Performance Category (CPC) scale was used to define patient's outcome at 180 days after cardiac arrest (CA) (CPC 1-2: good - CPC 3-5: poor neurologic outcome). To define a possible outcome related threshold of $SctO_2$, both the area or time of the $SctO_2$ curve below pre-defined $SctO_2$ thresholds as well as the presence of preset $SctO_2$ values were calculated and analyzed by univariate logistic regression.
**Results and discussion:** While 57 patients (53%) died, 50 patients (47%) survived with a good neurological outcome (CPC 1-2). Outcome prediction by the time under a preset $SctO_2$ threshold did reveal that a longer duration below a $SctO_2$ of 64% was associated with a poor neurological outcome (OR 0.98 95% CI [0.97 - 0.99]; p = 0.04). By analyzing the presence of a preset $SctO_2$ value, we found that (although not completely statistical significant) the odds to survive was almost 2.2 times lower whenever any $SctO_2$ value of 50% or 51% was observed during the entire 48 hour period (50%: OR 0.45 95% CI [0.21 - 1.00]; p = 0.05 and 51%: OR 0.50 95% CI [0.22 - 1.12]; p = 0.09).
**Conclusion(s):** Out-of-hospital cardiac arrest patients who spend more time below a $SctO_2$ of 64% had a worse outcome at 180 days post-CA. Moreover, the presence of any $SctO_2$ value around 50% in the first 48 hours post-CA seems associated with a lower odds to survive, although more studies with larger sample sizes are needed to confirm our preliminary results.

## 11AP08-8

### Clinical management protocol of preemptive complex hormone therapy in patients with coma III

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**Background and Goal of Study:** To prevent disorder and to improve hemodynamics, respiratory exchange and metabolism in patients with coma III by using combination of L-thyroxine, triiodothyronine, desmopressin acetate, methylprednisolone and insulin.
**Material and methods:** The study included 98 patients with coma III. They were divided into 2 groups: the 1st group included 43 patients with severe traumatic brain injury (TBI); the 2nd - included 55 patients with acute cerebrovascular disorder (ACD). Patients of the both groups were divided into two subunits: main subunit, patients who received hormones orally; and control subunit, patients who did not receive these drugs. During first and second days after hospitalization of patients have been measured hemodynamic, elektrolytes, biochemical parameters and respiratory exchange.

**Results and discussion:** Baseline characteristics of the groups had not significant difference. The first day the patients of the both groups needed vasopressor support by administration noradrenaline and/or dopmin. The second day in control subunits the dose of noradrenaline and dopmin wasn't changed significantly. In the course of the hormone therapy the dose of noradrenaline and dopmin was decreased significant: in patients with TBI from 0,175 (0,050-0,250) to 0,075 (0,030-0,100) mcg/kg˛min ($p<0$, 05) and from 6 (5,0-10,0) to 5 (0-7,0) mcg/kg˛min ($p<0,05$). And in patients with (ACD) from 0,10 (0,070-0,200) to 0,05 (0,050-0,100) mcg/kg˛min ($p<0,05$) and from 6,5 (5,00-9,00) to 5 (0-6,0) mcg/kg˛min ($p<0,05$). There were no significant changes in hemodynamic in patients with TBI and (ACD) of the control group, that was expected without correction of basal metabolism. Central venous pressure (CVP) increasing was observed, probably related to the massive infusion therapy. In the course of the hormone therapy in patients with TBI was registered increasing SAP by 8.5%, DAP by 12%, MAP - by 14%, CVP by 33%. The number of deaths in one year after heart transplantation among recipients from donors of main group is 5% less, than among control group recipients from donors and 13% less after kidney transplantations.
**Conclusion:** In connection with preemptive complex hormone therapy doses of noradrenaline and dopmin reduce significantly (by 43% and 20%), hemodynamic and gas exchange improve. In intensive preparation of organ donors is possible the administration of thyroid and pituitary hormones orally, particular by donors after TBI.

## 11AP08-9

### Recovery of an immunocompetent adult patient with cytomegalovirus meningoencephalitis which is meet the criteria of brain stem death

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**Background:** This case shows a extremely rare recovery proccess of a CMV infection in immunocompetent adult patient suffered severe neurological syndromes falls into a suspected brain stem death state complicated with pneumonia and pleural effusion.
**Case report:** A 19-year old male arrived at the hospital emergency department with reduced consciousness and seizure following high fever, headache, confusion and vomitus within a week before arrival. He was intubated and sent to the ICU. Physical examination found a nuchal rigidity and a tetraparesis with accentuated tendon reflexes. Electroencephalography (EEG) showed an acute structural lesion at right temporal or an epilepticus state. Cerebral spinal fluid (CSF) showed WBC count 16/mm$^3$, PMN 13/mm$^3$, MN 87/mm$^3$, glucose 42/dL and protein 216 mg/dL. Computer Tomography (CT) Scan was normal. IgM and IgG anti HSV were negative while IgM anti CMV was negative but IgG anti CMV was positive. The patient's clinical condition deteriorates, spontaneous respiration disappeared, cranial reflexes became negative and brain stem death (BSD) was suspected all brain stem tests showed no response. Vasopressor was used to maintain hemodynamic stability. Therapy included antiviral, corticosteroid, antibiotics, anticonvulsant, antipyretic and antifungal. On day 30 patient gave a very vague response to painful stimuli at supraorbital nerve and respiration started to appear on day 37. He was weaned from ventilator and moved from ICU on day 90.
**Discussion:** CMV infection in immunocompetent critically patients at ICUs has the prevalence ranges 0-35%. It can worsen the prognosis by prolong ICU stay, extend ventilator used and increase nosocomial infection [1]. The viral meningoencephalitis diagnose in this patient was made from fever, headache, stiff neck and vomiting as signs and symptoms of meningitis, while encephalitis indicated by loss of consiousness and cranial nerves dysfunction. CMV reactivation in this patient based on a positive result of IgG anti CMV and a negative result of IgM anti CMV [2].
**References:**
1. Jain M, Duggal S, Chugh TD. J. Infect. Dev. Ctries. 2011;5(8):571-579.
2. Osawa R, Singh N. Critical Care. 2009;13:1-10.
**Learning points:** BSD must be confirmed precautiously even there is a negative result for BSD tests. CMV meningoencephalitis should be considered even for an immunocompetent adult patient. Accurate therapy and simultaneous intensive care have a very important role in recovery proccess.

## 11AP08-10

### Increasing palliative care input for patients with poor prognosis in neurosurgical intensive care unit (NICU)

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**Background and Goal of Study:** There is Increasing evidence that a well-structured palliative care initiative in the form of an integrative or consultative or a combination of both into standard ICU care can provide benefits for patients and families, and decrease hospital and ICU length of stay.
The goal of the the study was to improve palliative care resources for patients with poor prognosis in the ICU. End points included satisfaction scores via a questionaire and quantitative data of ICU length of stay.
**Materials and methods:** We embarked on a first of a kind ICU-Palliative Collaboration and Project in Singapore. The aim was to improve referral rate to palliative care for patients with poor prognosis in NICU. Poor prognosis was defined as patients with at least one of the following referral criteria;
1. Hypoxic Iscahemic Encephalopathy
2. Severe Head Injury with Poor neurological prognosis
3. Extensive Intracerebral/Subarachnoid Haemorrhage
4. Low presenting Glasgow Coma Scale (GCS) of less than 6.
A multi-disciplinary team, consisting of intensivists, neurosurgeons, medical social workers, nurses and palliative care physicians formed the core team to lead this project in NICU.
Interventions included:
1. A structured screening tool to identify patients.
2. A referral criteria that all involved in care of patient agrees upon.
3. Communication workshop conducted for all nurses and physicians in NICU to broach end of life care issues.
4. Weekly multi-disciplinary rounds to discuss current cases and to debrief previous patients referred.
**Results and Discussion:**
1. The number of palliative care referrals for identified patients, increased from a baseline of 30% to an average of 85%.
2. Patient's relatives when interviewed via a predefined questionaire, showed a higher level of satisfaction with overall medical care in hospital.
3. There was a 1.3 day reduction of ICU stay for patients referred to palliative care, with its associated cost savings.
**Conclusion(s):** Palliative care in the ICU is an important part of management of patients with poor prognosis. It has been shown to improve family emotional outcomes and reduces ICU length of stay.
**References:**
1. IPAL-ICU consensus Group. *Crit Care Med 2010*
2. The changing role of palliative care in the ICU. Aslakson RA et al. *Crit Care Med 2014*
**Acknowledgements:** Tan Tock Seng Hospital, Neurosurgical Intensive Care Unit

## 11AP08-11

### Caregiver experience in critical care regarding treatment limits and withdrawal

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**Background and Goal of Study:** Ongoing organ support for dying patients may not be in their best interest and has resource implications. The decision to limit or withdraw active treatment in patients admitted to the intensive care unit (ICU) is often complex, multi-factorial, and emotive (1).
We aim to evaluate the ICU multi-disciplinary team (MDT) experience of managing patients with treatment limitation and identify areas needing improvement in order to enhance patient care, family experience and MDT efficacy.
**Materials and methods:** ICU MDT members completed an anonymous questionnaire over a two-week period, detailing their personal experiences managing end of life patients. Closed and open questions were used and responses were analysed with quantitative and qualitative methods.
**Results and discussion:** In total 40 responses were obtained. All staff felt that decisions regarding treatment limits and withdrawal were not always effectively communicated to themselves, with 20 (69%) of junior staff and 3 (38%)

of senior staff stating that communication within the MDT was ‚below ideal'. Thematic analysis identified several issues. These included the sole use of verbal communication, unclear written documentation, a lack of specific guidance and lack of consistency with frequent rotation of medical staff. As instructions were not clear, junior staff, not confident with decision-making, would err on the side of caution, sometimes continuing inappropriate treatments.
Respondents described times where they felt miscommunication had limited the support they could offer patients and their families. They reported feeling upset, frustrated and embarrassed due to lack of information. This led to a feeling that they were behaving in an unprofessional manner and were not providing the standard of care they desired. Staff felt that improved documentation clarifying any treatment limitations is needed to improve MDT communication and patient care.
**Conclusions:** End of life care is vital for patients and their families. In our study, staff members managing these situations felt that communication was sub-standard and this led to sub-standard care and personal and professional difficulties.
A proforma to clarify these decisions and improve MDT communication is being introduced to address these issues.
**References:**
1. Wilkinson DJC and Savulescu J "Knowing When to Stop: Futility in the Intensive Care Unit". *Current Opinion In Anaesthesiology* (2011). 24(2) p160-165

## 11AP09-1

### Ultrasonographic evaluation of right hemi-diaphragm excursions for prediction success in weaning from mechanical ventilation

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**Background and Goal of Study:** Mechanical ventilation-induced diaphragm atrophy is one of central problems in weaning process. Ultrasonographic (US) evaluation of diaphragm excursions could be a useful tool for prediction success in weaning from mechanical ventilation (MV) [1].
**Materials and methods:** A prospective observational study was conducted in patients undergoing weaning from MV, in Pauls Stradins Clinical University Hospital ICU. US was performed after patient met weaning criteria (according to local protocol) and it was decided to discontinue MV [2].
Patients with neuromuscular disorders and diaphragmatic paralysis were excluded. Measurements were performed once on Pressure Support Ventilation (PS ≤ 10cm$H_2O$, PEEP ≤ 5cm$H_2O$). The right hemi-diaphragms of included patients were evaluated by M-mode ultrasonography (Esaote MyLabGamma AC2541 1-8 MHz convex probe).
The average diaphragm excursions value (DEavg) was estimated from 3 sequential measurements. The rapid shallow breathing index (RSBI), dynamic compliance (Cdyn) and spontaneous tidal volume ($V_T$ spont) were obtained from the ventilator (Servo$^i$, Maquet). Failure to wean was defined as new onset of MV within 48 h after releasing from ventilator [2].
**Results and discussion:** We analyzed 44 patients, of these 17 (38.6%) failed weaning from MV. There were no significant differences between the successful weaning (SW) and unsuccessful weaning (UW) groups in demographic data and length of MV. DEavg and Cdyn differed significantly between SW and UW groups (*p=0.001* and *p=0.007,* respectively). RSBI and spontaneous tidal volume ($V_T$ spont) didn't show significant difference between the groups (*p=0.92* and *p=0.13,* respectively). DEavg showed the highest discriminative power for predicting success in weaning from MV compared with RSBI, Cdyn, VT spont (AUC 0.927; 0.486; 0.771 and 0.697, respectively) with best DEavg cut-off value 10.2 mm.
**Conclusions:** Our findings suggest that right hemi-diaphragm excursions assessed with M-mode ultrasonography is an accurate predictor for weaning success.
**References:**
1. Kim WY, Suh HJ, Hong SB, Koh Y, Lim CM (2011) Diaphragm dysfunction assessed by ultrasonography: influence of weaning from mechanical ventilation. Crit Care Med 39:2627-2630.
2. Boles JM, Bion J, Connors A, Herridge M, Marsh B, Melote C et al (2007) Weaning from mechanical ventilation. Statement of the Sixth International Consensus Conference on Intensive Care Medicine. Eur Respir J 29:1033-1056.

## 11AP09-2

### Lung echography as a predictive tool for extubation failure in intensive care

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**Background and Goal of Study:** Weaning from mechanical ventilation in intensive care is a major issue. the decision of extubation is based on clinical and biological criteria with a rate of failure of extubation of 10-20%. It is then important to search for new criteria to better predict the failure or success of a respiratory withdrawal attempt. The aim of this work is to assess the relevance of the LUS score (LUNG ULTASOUND SCORE) to predict the failure or success of extubation to H48.
**Materials and methods:** Prospective study involving intubated patients ventilated for more than 48 hours and has clinico-biological criteria for extubation. Pulmonary Ultrasound (LUS score), heart (LVEF, report E/Ea) were performed before and at the end of a 60 min spontaneous breathing trial on tube (VS).
Statistical analysis was performed using IBM SPSS 20. The normality of the distributions was evaluated by performing a Kolmogorov-Smirnov. Student's t test, Mann-Whitney test and the Wilcoxon test is used to compare the quantitative variables.
Predictive threshold value LUS score is determined by a curve ROC (Receiving Operating Curve) to determine the threshold beyond which we are exposed significantly to failure of extubation.
**Results:** 32 patients were included. 30 patients have passed the test successfully on VS tube and were extubated. 24 were finally weaned at 48 hours (group 1). 8 patients (20%) were re-intubated or have benefited from a NAV before 48 hours (group 2).
A statistically significant difference between groups 1 and 2 regarding age (57 ± 16 vs 31 ± 12, respectively; p = 0.002), history of COPD (85.7% vs. the 14.3%; p = 0.001 and water balance (-433 vs 200; p = 0.041).
After the test tube on VS, the reports E / A and E / E 'are significantly higher in group 2 (2 ± 0.7 vs 1.08 ± 0.2; p = 0.021) and (10, 6 ± 2.6 vs 6.9 ± 0.5; p = 0.006).LUS score was significantly higher in group 2, whether VSAI (16.25 ± 2.1 vs 9.3 ± 3, p = 0.01) or in the VS tubing (19.7 ± 2 5 vs. 11.8 ± 2.6, p <0.001).
In our study, a score of LUS in TET>16 predicted weaning failure with a sensitivity of 87.5% and a specificity of 83.3%. The AUC is 0.99. In sub COPD group, a LUS score lower than 14 predict success with a sensitivity and specificity of 100%.
**Conclusion(s):** The determination of the variation of pulmonary ventilation of the lung ultrasound score in the test weaning from mechanical ventilation predicted extubation failure to 48 hours especially among high-risk patients.

## 11AP09-3

### Influence of tidal volume and positive end-expiratory pressure (PEEP) on stroke volume variation in mechanically ventilated patients

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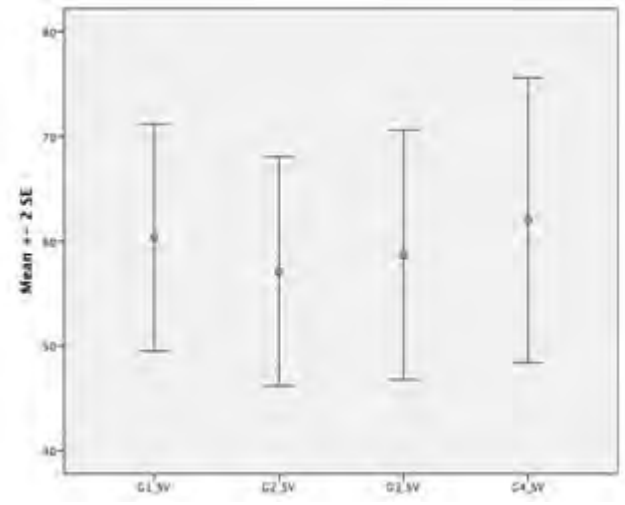
**Background and Goal of Study:** The cyclic changes in intrathoracic pressure due to the mechanical ventilation cause specific changes in pre and afterload. This finally influence the left ventricular stroke volume and cardiac output. Several studies have indicated that stroke volume variations are influenced by tidal volume and PEEP but none have evaluated different tidal volumes and PEEP values. Our intent was to see the best mechanical ventilator setting that affect cardiac output and stroke volume less.
**Materials and methods:** Following Ethics Commitee approval and informed patient's folk consent; 19 patients included in this study. This group comprised 14 men and 5 women who had an age range between 45 and 88 years. All patients were sedated, curarized and mechanically ventilated in a volume controlled mode. Four sets of measurements were performed in different ventilator settings. When measurement finished in each group, mechanically ventilator parameteres set for new group and waited 15 minutes for measurement between each group.
Group 1: TV 6 ml/kg, PEEP 5 cm$H_2O$;

Group 2: TV 6 ml/kg, PEEP 8 $cmH_2O$;
Group 3: TV 8 ml/kg, PEEP 5 $cmH_2O$;
Group 4: TV 8 ml/kg, PEEP 8 $cmH_2O$ were applied.
All measurements were performed in triplicate by echocardiography.
**Results and discussion:** The preliminary results showed no significant difference was observed for mean stroke volume and cardiac out put among groups (p>0.05)




*[Mean SV Values]*

**Conclusion(s):** Reuter and colleagues demonstrated a linear relationship between tidal volume and stroke volume variation. However, we were unable to show this relationship. This is a preliminary report and number of patients is small, we continue the study.
**Reference:**
1. Reuter DA, Bayerlein J, Goepfert MS et al. Influence of tidal volume on left ventricular stroke volume variation measured by pulse contour analysis in mechanically ventilated patients. Intensive Care Med 2003, 29:476-480.

## 11AP09-4

### Dynamic variables of fluid responsiveness during pericardial effusion

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**Background and Goal of Study:** Dynamic variables of fluid responsiveness, such as stroke volume variation or pulse pressure variation have become firmly established in algorithms for haemodynamic optimization (1).
Certain confounders of these measurements, like increased abdominal pressure, have been described (2).
Pericardial effusion may effect heart-lung interaction, however, the reliability of these variables in the presence of pericardial effusion is still elusive. The aim of the present study was to investigate their predictive power in a porcine model with pericardial effusion.
**Materials and methods:** Twelve german domestic pigs were studied before and during pericardial effusion. Instrumentation included a pulmonary artery catheter, a transpulmonary thermodilution catheter in the femoral artery and an 8.5 Fr introducer for volume infusion or blood withdrawal. Haemodynamic variables like cardiac output ($CO_{PAC}$) and stroke volume ($SV_{PAC}$) derived from pulmonary artery catheter, stroke volume variation (SVV) and pulse pressure variation (PPV) were obtained. Receiver operating analysis has been performed to evaluate the predictive power.
**Results and discussion:** At baseline, SVV, PPV as well as $CO_{PAC}$ and $SV_{PAC}$ reliably predicted fluid responsiveness (area under the curve (AUC): 0.81 (p=0.02), 0.82 (p=0.02), 0.74 (p=0.07) and 0.82 (p=0.02)). In contrast, central venous pressure and pulmonary artery occlusion pressure failed to predict fluid responsiveness. After induction of pericardial effusion the predictive power of dynamic variables was impaired and only $CO_{PAC}$ and $SV_{PAC}$ allowed significant prediction of fluid responsiveness (AUC: 0.77 (p=0.04) and 0.76 (p=0.05)) with clinically relevant changes in threshold values.
**Conclusion(s):** In this porcine model, pericardial effusion abolished the ability of dynamic variables to predict fluid responsiveness. As $CO_{PAC}$, $SV_{PAC}$ enabled prediction, its usage in a clinical setting is clearly restricted by the change in threshold value.
**References:**
1. Benes J et al. Crit Care. 2010;14(3):R118,
2. Renner J et al. Crit Care Med. 2009 Feb;37(2):650-8

## 11AP09-5

### A prospective crossover study for assessment of Global End-Diastolic Index to compare of albumin administration compared to crystalloid in the perioperative inflammatory status

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**Background and Goal of Study:** Albumin administration in critically ill patient is controversial. Our previous research showed that albumin increases blood volume 3 days but not 1 or 2 day(s) after major surgery when inflammation-induced increases in vascular permeability are presumably improved. To examine whether the differential effects of albumin and crystalloid differ depending on the days after surgery, we conducted this prospective crossover study to compare the changes in global end-diastolic index (GEDI) following administration of either albumin or crystalloid on various days after major head and neck surgery.
**Materials and methods:** We enrolled consecutive patients who underwent oral and pharyngeal tumor resection that requires 72-hour sedation after surgery. From postoperative day 1 to 3, 100ml of 25% albumin and 500ml of crystalloid were administrated once a day at an interval of 6 hours. The sequence of administration of albumin vs. crystalloids was randomly allocated. On each day before and immediately after each fluid administration, the GEDI was measured using the transpulmonary thermodilution technique. The change of GEDI was calculated as (Post GEDI- Pre GEDI) / PreGEDI x 100 (%). This parameter was compared with respect to albumin and crystalloid administration in all the patients, and also in a subgroup of patients with hypoalbuminemia (serum albumin concentration <3.0 g/dl) and hyper inflammatory status defined as above average of white blood cell account.
**Results and discussion:** Fifteen patients were studied, and the total numbers of measurement thermodilution after albumin and crystalloid administration were 37 and 38 times, respectively. When all the patients were considered, the changes in GEDI did not differ between albumin and crystalloid (albumin: 4.0±10.8 % vs. crystalloid: 0.1±8.7 %, p=0.21). In the presence of hypoalbuminemia, the changes in GEDI tended to be greater with albumin (6.1±9.3 % for albumin vs. 0.9±7.3 for crystalloid; P=0.05).
In the hyper inflammatory status with hypoalbuminemia, albumin effect on GEDI tended to be greater compared to crystalloid (albumin: 4.3±11.0 % vs. crystalloid: -2.8±6.6 %, P=0.08).
**Conclusions:** In the patients with hypoalbuminemia and hyper inflammatory status, albumin may increase the circulating blood volume as measured by GEDI. However, our small sample size preclude any firm conclusion to be made, and the study is currently in progress.

## 11AP09-6

### The reliability of IVC delta index as a predictor of fluid responsiveness in different mechanical ventilator adjustments

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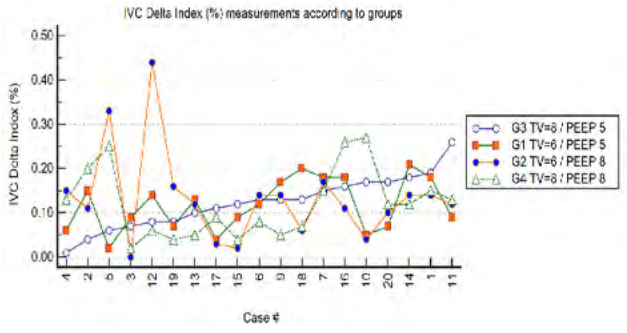
**Background and Goal of Study:** As avoiding hypovolemia but also fluid overload is of utmost importance in the management of critical care unit patients. Mechanical ventilation induces cyclic variations in vena cava diameter measured by ultrasonography have been used as an accurate predictor of fluid responsiveness. Barbier and colleagues (1) demonstrated that delta index (DI) of IVC was able to predict fluid responsiveness. Multiple studies of IVC DI have been performed, but they used the same tidal volumes (TV) 8 ml/kg. Our intent was to see whether or not the DI using lower tidal volumes and higher PEEP ventilation was similar to that obtained in previous studies.
**Materials and methods:** Following Ethics Commitee approval and informed patient's folk consent; 19 patients included in this study. This group comprised 14 men and 5 women who had an age range between 45 and 88 years. All patients were sedated, curarized and mechanically ventilated in a volume controlled mode. Four sets of measurements were performed in different ventilator settings. When measurement finished in each group, mechanically ventilator parameteres set for new group and waited 15 minutes for measurement between each group.
Group 1: TV 6 ml/kg, PEEP 5 $cmH_2O$; Group 2: TV 6 ml/kg, PEEP 8 $cmH_2O$; Group 3: TV 8 ml/kg, PEEP 5 $cmH_2O$; Group 4: TV 8 ml/kg, PEEP 8 $cmH_2O$ were applied. All measurements were performed in triplicate by echocardiography. Subcostal approach was used to measure the IVC diameter.
**Results and discussion:** The preliminary results demonstrated no significant difference between the estimated mean IVC DI among four groups ($p>0.05$). Pairwise comparison of TV 8 ml/kg and PEEP 5 cmH2O group with other groups by Bland-Altman analysis showed a clinically significant bias with wide limits of agreement (LOA, Group 1 vs Group 3: 13 %; Group roup 2 vs Group 3: 26 %; Group 4 vs Group 3:18%).




*[Graphic1]*

**Conclusion(s):** Our results show that measurement of IVC DI cannot be reliably used as a predictor of fluid responsiveness with different ventilator settings. This is a preliminary report and we continue the study.
**Reference:**
1. Barbier C, Loubires Y et al. Intensive Care Med. 2004;30:1740-6.

## 11AP09-7

### A more practical way to predict fluid responsiveness in mechanically ventilated patients: passive leg rising

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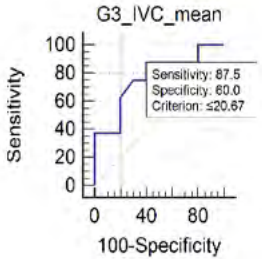
**Background and Goal of Study:** Ultrasonographic measurements of respiratory changes in inferior vena cava (IVC) diameter were offered as predictors of fluid responsiveness for patients where invasive measurements were not feasible and easier parameters were sought. The aim of this study was to assess the diagnostic utility of several hemodynamic parameters to detect the presence of fluid responsiveness. Second, effect of different ventilator parameters on those variables were also assessed.
**Materials and methods:** Following Ethics Commitee approval and informed patient's folk consent; 18 patients included in this study. All patients were sedated, curarized and mechanically ventilated in a volume controlled mode. Four sets of measurements were performed in different ventilator settings. When measurement finished in each group, mechanically ventilator parameteres set for new group and waited 15 minutes for measurement between each group. Group 1: TV 6 ml/kg, PEEP 5 $cmH_2O$; Group 2: TV 6 ml/kg, PEEP 8 $cmH_2O$; Group 3: TV 8 ml/kg, PEEP 5 $cmH_2O$; Group 4: TV 8 ml/kg, PEEP 8 $cmH_2O$ were applied. Passive leg rising(PLR) were applied in the patients who ventilated TV 8 ml/kg, PEEP 5 $cmH_2O$. Patients were separated into responders and non-responders by the change in CVP ($R \geq 2$ cm, $NR<2$ cm) following passive leg rasing (PLR) maneuver.
**Results and discussion:** HR change after PLR was found as an accurate parameter to discriminate responders than non-responders with an AUC of 0.71 and any increased HR after PLR was 50 % sensitive and 100% specific for being a responder. Mean IVC diameter in Group 3 was also accurate (AUC: 0.76) and all patients but one with an IVC diameter <20.6 mm were responders (Sp: 60 %, Sens: 87.5%). Accuracy of mean IVC diameters were significant and the same for Group1, Group 2 and Group 3 but Group 4. All other parameters were statistically not significant ($p>0.05$).




*[Graphic 1]*

**Conclusion(s):** Mean IVC diameter can be used as a reliable predictor of fluid responsiveness in mechanically ventilated patients. This is a preliminary report and we continue the study.
**References:**
Marik P, Monnet X, Teboul JL. Annals of Intensive Care 2011, 1:1

## 11AP09-8

### The right ventricle after applying PEEP in mechanical ventilated patients. A Transesophageal Echo-Tissue Doppler study

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**Background and goal of study:** It is well known that even a slight increase in pulmonary vascular resistance can overload a normal right ventricle, thereby impairing its systolic function. Also, right ventricular disfunction is strongly related to the prognosis in patients with respiratory failure. We illustrate the valuable information provided by transesophagial echocardiography for hemodynamic monitoring of right ventricle during applying low and moderate levels of PEEP in mechanical ventilated patients.

**Material and methods:** 14 patients under pressure control mechanical ventilation were studied. The two-dimensional transesophagial echo, M-mode and tissue Doppler were used and a total of 10 parameters for each patient were recorded: tricuspid ring systolic velocity (St), tricuspid annular plain systolic excursion (TAPSE), myocardial performance index (MPI), myocardial isovolumic acceleration time (IVA), ejection time in pulmonary artery (ET), end-systolic (EcIS) and end-diastolic (EcID) eccentricity index of left ventricle, end-systolic (ESA) and end-diastolic (EDA) area of right ventricle and, finally, the fractional area change (FAC) of right ventricle. Measurements were made initially with zero PEEP, then 10 minutes after applying 5cm$H_2O$ PEEP and again 10 minutes after applying 10cm$H_2O$ PEEP.
**Results:** After applying 5cm$H_2O$ PEEP no statistically significant changes were observed. By increasing PEEP to 10cmH2O statistically significant changes were observed in:
St from 10,86±3,8 at 0 PEEP to 8,7±2,9cm/sec
TAPSE:2,876±0,64 to 2,385±0,55cm
IVA:2,2692±0,93 to 2,8536±1,62m/sec$^2$
ET:259,27±17,47 to 229,34±31,22msec
EcID:0,9±0,07 to 0,99±0,08
EDA: 21,372±5,01 to 18,87±4,15cm$^2$
Regarding other parameters, the changes were insignificant.
**Conclusion:** In our study no harmful effect on function of right ventricle was observed by applying 5 cm$H_2O$ PEEP. At 10 cm$H_2O$ PEEP changes in the function of right ventricle were observed. It seems that these changes are mainly due to reduced filling of right ventricle and, secondly, they come as a result of increased right ventricular afterload.
**References:**
Jardin F, Vieillard-Baron A: Right ventricular function and positive pressure ventilation in clinical practice: from hemodynamic subsets to respirator settings. Intens Car Med 2003, 29:1426-1434
Bouferrache K, Vieillard-Baron A: Acute respiratory distress syndrome, mechanical ventilation and right ventricular function. Cur Opin Crit Car 2011, 17:30-35

| | | | | |
|---|---|---|---|---|
| Participants' characteristics | Age (yr) | 35.1 (10.4) | | |
| | Sex (m/f) | 7 / 2 | | |
| | Weight (kg) | 60.2 (8.2) | | |
| | Height (cm) | 167 (9.6) | | |
| | BMI (kg/m$^2$) | 21.3 (0.80) | | |
| Cross sectional area (cm$^2$) | | | | |
| | | Bed angle (degree) | | |
| NIPAP (cmH$_2$O) | | 0 | 20 | -20 |
| 0 | Inspire | 0.78 (0.56) | 0.30 (0.35) | 1.33 (0.90) ** |
| | Expire | 0.75 (0.53) | 0.27 (0.33) | 1.40 (0.85) |
| 5 | Inspire | 0.78 (0.56) | 0.37 (0.422) | 1.37 (0.69) |
| | Expire | 0.92 (0.50) | 0.37 (0.44) | 1.47 (0.61) |
| 10 | Inspire | 1.21 (0.56) | 0.54 (0.44) | 1.55 (0.97) |
| | Expire | 1.21 (0.47) * | 0.65 (0.36) * | 1.68 (0.97) * |
| AP-diameter (mm) | | | | |
| | | Bed angle (degree) | | |
| NIPAP (cmH$_2$O) | | 0 | 20 | -20 |
| 0 | Inspire | 7.63 (3.76) | 4.23 (2.87) | 11.3 (4.07) ** |
| | Expire | 7.51 (3.76) | 3.85 (2.66) | 11.6 (3.64) |
| 5 | Inspire | 8.95 (3.79) | 4.69 (3.20) | 11.5 (2.82) |
| | Expire | 9.14 (3.31) | 4.78 (3.40) | 11.9 (2.24) |
| 10 | Inspire | 10.77 (2.87) | 6.66 (3.24) | 12.4 (3.67) |
| | Expire | 10.90 (2.55) * | 7.56 (2.71) * | 12.8 (3.42) * |

BMI: body mass index, NIPAP: non-invasive positive airway pressure, AP-diameter: antero-posterior diameter of internal jugular vein. Data were shown as mean (SD). *: $P < 0.05$ between groups.

*[Table. Demographic data and results]*

## 11AP09-9

### Effects of non-invasive positive airway pressures on right internal jugular vein size

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**Background:** Internal jugular vein (IJV) catheterization is an essential and inevitable procedure during intensive care. The larger size of IJV was an absolute factor for easy and reliable catheterization. The effect of positive end-expiratory pressure is known as a one of useful procedures to enlarge IJV diameter; however, the investigations were limited in the patients who was induced general anesthesia with oro-tracheal intubation. The aim of current study was to evaluate the effect of non-invasive positive airway pressures (NIPAP) on the right IJV size.
**Methods:** After the approval from the division committee, we enrolled 9 healthy volunteers without any complications in our department. After equipping NIPAP mask, the participants were in supine position (0º) on the operating table and spontaneously breathe with 0, 5 and 10 cm$H_2O$ NIPAP by the ventilator (Respironics V60, Philips, Tokyo, Japan). During each implementation of NIPAP, the table tipped 20º head up and - 20º down. The cross-sectional area (CSA) and antero-posterior diameter (APD) of right IJV were determined using ultrasound linear transducer (CX50, Phlips, Tokyo, Japan). The CSA and APD were analyzed using ANOVA.
**Results and discussion:** The both bed angle and NIPAP were independently significant factor to enhance the CSA and APD during NIPAP breathing (Table). NIPAP enlarged IJV size in all positions, especially in head up position. Unlike the settings in operating room, some of admitting patients to intensive care unit required for taking reverse Trendelenburg position because of heart failure and pulmonary edema. IJV catheterization under NIPAP could be a solution of appropriate procedure and reduction of symptom.
**Conclusions:** Not only for respiratory support but also for steady vascular access to IJV, the NIPAP might be an effective and useful tool for critically ill patients.
**References:**
1. Lee SC, et al. Acta Anaesthesiol Scand 2012; 56: 840-5.
2. Zhou Q, et al. Eur J Anaesthesiol 2012; 29: 223-8.
3. Marcus HE, et al. Anesth Analg 2010; 111: 423-6.

## 11AP09-10

### A comparison of real-time ultrasound-guided method and anatomical landmark technique for subclavian vein catheterization

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**Background and Goal of Study:** Several meta-analysis and recent clinical practice guidelines strongly support ultrasound guidance (USG) when inserting through the internal jugular vein (IJV) [1]. However, there are few data on the potential advantages of the use of USG for subclavian vein (SCV) catheterization.
The aim of this study was to determine whether USG of SCV catheterization reduces catheterization failures and adverse events compared to the traditional "blind" landmark method (LM).
**Material and methods:** After approval from the local Ethics Committee. We conducted a prospective randomized study from January to June 2015. Patients requiring a central venous catheter placement (CVC) in non emergent conditions were randomly allocated into 2 groups: real-time USG SCV catheterization according to the longitudinal approach (Group US) and anatomical LM method (Group LM). The non inclusion criteria were the presence of a coagulopathy or the vein thrombosis. All procedures were performed by the same novice operator.
The primary outcome parameter was the catheterization success rate. The number of attempts, the number of redirections, the access time, and catheterization-related mechanical complications were recorded. Statistical analysis was performed using IBM SPSS 20.
**Results and discussion:** 70 patients were included, 35 in Group US and 35 in Group LM. Success rate of SCV catheterization was 100% in Group US versus 85.7% in Group LM (p=0.54). Success rate was significantly higher in the obesity subgroup US (100%) than obesity subgroup LM (25%) with p=0.024. Other results were expressed in Table 1. The evolution of the acces time in terms of the patients' rank showed a significant learning curve in the US group ($r^2$=0.5854; p=0.00022), however, in the LM group this relation was weak ($r^2$=0.24; p=0.2).

| | Group US | Group LM | P |
|---|---|---|---|
| Success rate in the first attempt (%) | 82.9 | 40 | 0.0001 |
| The number of attempts | 1[1-1] | 2[1-4] | 0.0001 |
| The incidence of redirection of the needle (%) | 14.3 | 68.6 | 0.0001 |
| The number of redirections | 0[0-0] | 2[0-5] | 0.0001 |
| The access time (sec) | 19 [14 - 40] | 48 [15,75 - 70,25] | 0.028 |
| Complication rate (%) | 5.7 | 37.1 | 0.001 |

*[Table 1]*

**Conclusion(s):** Real-time USG infraclavicular SCV catherization is more effective than the traditional LM technique with best success rate and less rate of complications. This technicis easy to learn so it allows the inexperimented operator to be quickly efficient.

**Reference:**

1. Intensive Care Med 2012;38(7):1105-17

## 11AP09-11

### Evaluation of central venous catheters pose under clavicular and ultrasound-guided internal jugular by young residents

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**Introduction:** Central venous track laying is preferable SVC territory even if exposed to a significant risk of complication. We studied the impact of ultrasound for the central track laying subclavian and internal jugular in terms of learning, time of laying and incidence of complications.

**Materials and methods:** Patients were enrolled from March to September 2015. The ultrasound guidance was performed with a portable device like Sonosite and a high frequency probe (7,5MHz). Data collected were: the patient's morphological data, the exposure time and possible complications. All punctures were performed using the cross section with a vascular puncture "off plan". The residents received theoretical training followed practical examples before being included in the study.

**Results:** 20 central pathways subclavian(sc)and20 internal jugular(jug) were included.

The results in terms of learning, success and complications are presented in Table . the learning was fast: after laying the vein catheters 5 subclavian and 3 to the internal jugular vein, a resident was able to successfully placing a central line in the first puncture. The central venous line has been set up in the first puncture in 62% of cases. The subclavian puncture site averaged 55 mm below the clavicle and 90 outside the manubrium. For the internal jugular vein is behind the common carotid artery in 35% of cases and within in 20% of cases. The encountered complications were arterial puncture, a case of aberrant course (retrograde) and one case of pneumothorax in the way subclavian; and 3 cases of arterial puncture in the internal jugular.

First attempt success rate:sc (75%) vs jug (85%) p= 0.47;Average number of puncture: sc (1.35) vs jug (1.3) p= 0.82; Complication rate:sc (15%) vs jug (15%) p= 1; Average time guide the climb(min): sc (8,6) vs jug (7.9) p=0,23; Medium difficulty level (0à10): sc (4/10) vs jug ( 3/10) p= 0.66.

**Conclusion:** Learning the central venous line break jugular or subclavian under ultrasound guidance is fast. The introduction of ultrasound guidance device lengthens the preparation time but must be weighed against the high rate of success in the first puncture.

The ultrasound guidance can puncture the subclavian vein more laterally, away from the pleural dome considerably reducing the risk of pneumothorax and to reduce the risk of arterial puncture to the external jugular vein. The study showed no difference between the subclavian and internal jugular vein.

## 11AP09-12

### Noninvasive cardiac output measurement using the volume clamp method in cardiosurgical intensive care unit patients: a comparison with the pulmonary artery catheter

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**Background and Goal of Study:** The CNAP technology (CNSystems Medizintechnik AG, Graz, Austria) provides noninvasive continuous recording of the arterial pressure waveform based on the volume clamp method. Recently, an algorithm for measuring cardiac output (CO) using pulse contour analysis of the CNAP-derived arterial waveform became available. In this study, we compared CO measurements and trending capability of the novel CNAP-CO (CNCO) with intermittent invasive CO measurements derived from the pulmonary artery catheter (PAC; PAC-CO) in cardiosurgical intensive care unit patients.

**Materials and methods:** In this interim analysis, we analyzed simultaneously obtained CNCO and PAC-CO measurements in 41 patients during the first hours after off pump coronary artery bypass surgery. We performed 3 independent sets of 5 consecutive thermodilution measurements each per patient. The average of the 3 closest of the 5 PAC-CO measurements was used for comparison with the average of the corresponding CNCO values. Four pairs of measurements were excluded due to artifacts resulting in 119 paired measurements for analysis. In addition, we analyzed 27 cardiac output-modifying manoeuvres to evaluate trending ability. We conducted 2 separate comparative analyses: 1) CNCO calibrated to the first simultaneously measured PAC-CO value ($CNCO_{cal}$) vs. PAC-CO and 2) CNCO auto-calibrated to biometric patient data ( $CNCO_{bio}$) vs. PAC-CO.

Agreement between the two methods was statistically assessed by Bland-Altman analysis and by calculating the percentage error (PE). For evaluating trending ability, we calculated the concordance rate (CCR; exclusion zone 0.5 L/min).

**Results and discussion:** For $CNCO_{cal}$, the Bland-Altman analysis revealed a mean difference of -0.2 L/min, a standard deviation of ±0.5 L/min and limits of agreement of -1.1 to +0.8 L/min. The PE and CCR were 19% and 100%, respectively. For $CNCO_{bio}$, the Bland-Altman analysis showed a mean difference of +0.6 L/min, a standard deviation of ±1.1 L/min and limits of agreement of -1.6 to +2.8 L/min. The PE and CCR were 45% and 94%, respectively.

**Conclusion(s):** In this clinical study in cardiosurgical intensive care unit patients, $CNCO_{cal}$ showed good agreement (PE 19%) and good trending capability (CCR 100%) when compared with intermittent pulmonary artery thermodilution. For $CNCO_{bio}$, we observed a higher PE (45%) but acceptable trending capability (CCR 94%).

## 11AP10-1

### Whole blood riboleukogram analyses of patients after heart surgery identifies DRAXIN and ICAM-1 mRNA levels as markers for early high-risk stratification

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**Background and Goal of Study:** Sepsis is a severe disease demanding quick diagnosis. The riboleukogram, representing the mRNA expression of blood cells, might be a valuable tool to stratify patients into high- and low-risk ones. We hypothesize that gene expression from molecules involved in inflammatory processes might represent reliable markers. Intercellular adhesion molecule (ICAM)-1 is a classical a pro-inflammatory mediator and DRAXIN, is a neuronal guidance protein. The main goal of the study was to validate DRAXIN and ICAM-1 riboleukogram as predictive stratification biomarkers for patients following heart surgery.
**Materials and methods:** The study was approved by the institutional ethics committee (#265/09). Patients (n=23) with written consent being admitted on ICU after heart surgery were included. Daily blood sampling was continued until discharge from ICU or patient's death. The plasma was separated and the blood pellet was used for mRNA Isolation. DRAXIN and ICAM riboleukogram was assessed by RT-PCR (StepOne Plus, AB) and retrospectively correlated with the clinical data. Data: means ± SEM; tests: Log-rank test, ANOVA, Tukey's multiple comparisons test; significance level: $p<0.05$.
**Results and discussion:** Draxin mRNA in the first sample was significantly increased in patients staying >10 days on ICU (2162,0±124,8 rel. mRNA expr.) vs. values from patients that stayed 1-2 days (973,0±79,2 rel. mRNA expr.; $p<0.001$) or 3-10 days (948,7±176,7 rel. mRNA expr.; $p<0.001$). DRAXIN mRNA levels directly correlated with the length of stay ($p=0.0296$). Similarly, ICAM-1 mRNA levels from the first blood sample were significantly increased in patients with >10 days on ICU (215,2±44,7 rel. mRNA expr.) vs. those from patients with 1-2 (39,65±4,9 rel. mRNA expr.; $p<0.01$) and 3-10 (36,77±5,6 rel. mRNA expr.; $p<0.01$) days. ICAM-1 expression correlated with the stay on ICU ($p=0.0373$). Draxin mRNA levels rose earlier than IL-6 protein levels and thereby detected sepsis episodes in average 3,5±0,9 days earlier.
**Conclusions:** The riboleukogram measurements were easy to perform, reproducible and practicable for the clinical use. The mRNA expression in the whole blood of inflammation related factors might represent an attractive alternative to the standard protein detection as it measures the pre-stage of proteins and thus detects regulations much faster, and thereby saving valuable time for adequate sepsis treatment.

## 11AP10-2

### Comparing two regimens of antibiotic prophylaxis in cardiac surgery

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**Background and Goal of Study:** Guidelines recommend that duration of antibiotic prophylaxis in cardiac surgery should be no more than 48 h, but the growing number of facts say that it could be 24h.
**Materials and methods:** All 125 consecutive patients in 2014 had elective coronary artery bypass grafting and/or valve impairment as a result of noninfective valve desease and were divided in two groups. Preoperative, intra and postoperative data were analyzed. Group 1 (n = 56) was administered cefazolin for 24 h as antibiotic prophylaxis (3 g/day); group 2 (n = 69) - patients with cefazolin for 72 h antibiotic prophylaxis (1 g every 8 h). Continuous variables were analyzed by using descriptive statistics (mean or median); categorical data were analyzed as proportions. Statistical analyses was performed by using SAS software.
**Results and discussion:** Pre and intraoperative characteristics were almost the same in both groups: median age 64,9±7,2 and 60,8±8 ($p<0.0025$), body mass index 28,8±4,8 and 29,1±4,1 ($p>0.1$), diabetes mellitus 15 (26,8%) and 14 (20,3%) ($p>0.1$) in group 1 and 2 respectively. Duration of stay in intensive care unit (ICU) was 21,1 (19,9 - 23,4) h and 20,7 (18,5 - 23,7) h ($p>0.1$), postoperative hospitalization 13 (9 - 15) d and 13 (11 - 16) d were also similar in both groups. The whole frequency of postoperative infectious incidents had 12 patients (21,4%) and 9 patients (13%) ($p>0.1$) in the group 1 and 2 respectively, whereas pneumonia had 3 patients (25%) and 4 patients (44,4%) in group 1 and 2 respectively, $p<0.01$) and switching from antibiotic prophylaxis to therapy were significantly higher in group 1, where antibiotic prophylaxis lasted for 24 h. Mediastinitis had 2 patients and 3 patients in group 1 and 2 respectively ($p>0.1$). No mortality was found in both groups.
**Conclusion(s):** 24 h antibiotic prophylaxis does not lead to higher incidence of surgical site infection and longer duration of postoperative hospitalization and stay in ICU although we found out that postoperative pneumonia and shifting to antibiotic therapy was more often in group 1.
**References:**
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## 11AP10-3

### Remote ischemic preconditioning does not attenuate acute mountain sickness and high altitude-induced pulmonary hypertension at 3450 m

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**Background and Goal of Study:** Remote ischemic preconditioning (RIPC) attracted great interest because it seems to protect an organ remote from the preconditioned site such as arm or leg from damage induced by subsequent prolonged hypoxia or ischemia. Protective effects of RIPC have been found for various organs, including the heart, brain, and lung. Acute mountain sickness (AMS) and high altitude pulmonary edema (HAPE) represent the cerebral and the pulmonary form of high altitude diseases. In AMS, hypoxia-induced cerebral vasodilation leading to activation of the trigeminovascular system is considered to play a pivotal role. In HAPE an exaggerated hypoxic pulmonary vasoconstriction constitutes a key factor. We hypothesized that RIPC protects the brain from AMS and the lung from an exaggerated rise in pulmonary artery pressure at 3450 m.
**Materials and methods:** After approval by the institutional ethics committee 40 healthy, non-acclimatized volunteers were randomized into 2 groups. At low altitude (Lauterbrunnen, 750 m, Switzerland) the RIPC group (n=20) underwent 4 cycles of lower limb ischemia that was induced by inflation of 2 blood pressure thigh cuffs to 200 mmHg for 5 min followed by 5 min of reperfusion. In the control group (n=20) the manoeuvre was timed identical but the cuffs were inflated to only 20 mmHg. Thereafter, participants completed a passive ascent by railway over 2 h to the research station at the Jungfraujoch (3450 m, Switzerland). After 5 h, 10 h, 24 h, 29 h, 34 h and 48 h at high altitude AMS was evaluated by the Lake Louise score (LLS) and the AMS-C score, and pulmonary artery systolic pressure (PASP) was assessed by transthoracic echocardiography.
**Results and discussion:** There was no significant difference between the RIPC and the control group neither in the incidence (RIPC: 35%, control: 35%) nor in the severity of AMS (maximum in the RIPC and in the control group after 24 h at high altitude. LLS: 4,6±4,1 and 3,0±1,8; AMS-C Score: 0,69±0,9 and 0,37±0,08, respectively; P>0,20; mean±SD). Furthermore, there was no difference in PASP between both study groups (maximum pressure after 10 h at high altitude in RIPC: 33±8 and 37±7 mmHg in controls; P=0,19).
**Conclusion:** This study indicates that RIPC, performed immediately before passive ascent to 3450 m, does not attenuate AMS and the degree of high altitude pulmonary hypertension. Thus, RIPC cannot be recommended for prevention of high altitude diseases.

## 11AP10-4

### Airway complications in pediatric patients with congenital heart disease

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**Background and Goal of Study:** Airway complications in operated children with congenital heart disease (CHD) leads to serious difficulties in anesthetic management and postoperative intensive care. We performed retrospective study of 8-year management experience of patients with CHD, complicated by airway problems (compressions, malacia).
**Materials and methods:** From 2008 till 2015 year in our clinic there were operated 8726 children with CHD. For the diagnostic of airway complication we used clinical sings, X-ray, fiber-optic bronchoscopy, computer tomography, magnetic resonance imaging. Using these methods we detected group of patients with airways obstructions, whom we estimated the presence and severity of airways compression or tracheobrochomalacia. That represented a study group, that was compared with the patients, that had not airway complications. Demographic data, time of mechanical ventilation and ICU stay, 30-day mortality were calculated as the median and compared with Mann-Whitney U test.
**Results and discussion:** Study group consisted of 103 patients, who had disorder of airway patency. That represented 1,4% off all our operated patients. Perioperative and anesthetic management of these patients was performed with due to consideration for their condition and cardiac disease. 71 patient (69%) had different amount of narrowing of trachea or bronchi. 32 patients (31%) had sings of tracheobronchomalacia. Control group consisted of 8623 patients (98,6%), who had not such concomitant problems during perioperative period. Median time of ICU stay in study group was 12 days, whereas in control group it was 3 days ($p<0,05$). Median time of mechanical ventilation for study group was 68 hours, that was significantly longer then analogous time for the patients without airway complications - 11 hours ($p<0,05$). The mortality rate in study group was 7,7 %, while this rate for all pediatric patients that were operated last 8 years in our clinic was 1,4% ($p<0,05$).
**Conclusion(s):** Airways compressions and tracheobronchomalacia in patients with CHD can complicate their postoperative period significantly. Airway complications lead to prolonged time of mechanical ventilation and time of ICU stay. Our position is to provide more accurate respiratory system assessment in those patients whom are expected concomitant airways compressions.

## 11AP10-5

### Improving care of patients undergoing coronary artery bypass graft surgery: introduction of a post-operative care pathway

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**Aims:** Specialised post-operative care is challenging due to the complex nature of the service and the frequent rotation of junior medical and nursing staff on the cardiothoracic intensive care unit. After elective coronary artery bypass graft (CABG) surgery, several aspects of care are important in reducing morbidity and mortality. An audit was conducted to assess performance in delivering optimum care, and a protocol developed to address deficiencies.
**Methods:** An audit cycle was carried out against departmental standards for post-operative care after CABG surgery. Data was collected prospectively over a two week period. A multi-disciplinary post-operative care pathway was developed to provide a structured timeline to ensure appropriate and timely treatment was delivered. The pathway was publicised and implemented, and a re-audit carried out.
**Results:** 22 patients fulfilled inclusion criteria for the initial audit. The results are summarised in table 1. Notable deficiencies included timing of aspirin loading, antibiotic prophylaxis, pacemaker checks and chest radiograph interpretation. The CABG pathway was utilised in 14 of the 22 patients (64%) included in the re-audit. A significantly higher proportion of patients received timely aspirin therapy when the CABG pathway was used ($p=0.0073$). Compliance with antibiotic prophylaxis and post-operative pacemaker checks also increased with pathway use, and chest radiograph interpretation was significantly improved ($p=0.0009$). All 14 patients received appropriate VTE prophylaxis after pathway introduction, an improvement on previous practice.

| Departmental standards | Initial Audit (% compliance with departmental standards) | Re-audit with CABG Pathway (% compliance with departmental standards) | p value |
|---|---|---|---|
| Appropriate aspirin loading/ omission | 90.1% | 100% | 0.5111 |
| Aspirin loading within 6-10 h | 42.9% | 85.7% | 0.0073 |
| Prophylactic antibiotics | 54.5% | 85.7% | 0.0756 |
| Post-operative ECG | 95.5% | 100% | 1.0000 |
| Post-operative pacemaker check | 66.7% | 75% | 1.0000 |
| VTE prophylaxis Day 1 | 72.7% | 100% | 0.0625 |
| VTE prophylaxis Day2 | 86.3% | 100% | 0.2667 |
| Chest radiograph after chest drain removal | 86.3% | 92.9% | 1.0000 |
| Chest radiograph result documented | 13.6% | 71.4% | 0.0009 |

*[Table 1. Audit cycle results]*

**Conclusions:** The audit highlighted several areas of post-operative management that could be improved. Compliance with all departmental standards increased with CABG pathway use but uptake of the new pathway was substandard and may improve with increased awareness. We aim to further promote the CABG pathway and introduce similar pathways for other elective cardiac surgeries.

## 11AP10-6

### Modified trans-laryngeal tracheostomy is safe for ventilator-dependent cardiac patients

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**Background and Goal of Study:** Tracheotomy is performed by using three different methods: Traditional (surgical), Percutaneous Dilatation Tracheostomy (PDT), and Trans Laryngeal Tracheostomy (TLT), or classical Fantony method. In classical tracheostomy through the larynx, 31.1 percent of difficulty is encountered and reported because of retrograde passage of guide wire from the trachea to the larynx. In this study, a new method has been introduced (modified Fantony method) in order to reduce and correct the technical difficulty of classical Trans Laryngeal Tracheotomy through the larynx.
**Materials and methods:** The present study has been conducted as a prospective case series. The study population was 159 patients hospitalized because of cardiac diseases, which their stay in ICU and cardiac CCU became longer than one week, and were consulted and advised for elective tracheostomy, so modified tracheotomy through larynx (MTLT) was performed for all patients (the new method).
**Results and discussion:** Modified tracheotomy through the larynx (MTLT) was performed on all patients with no technical problems, and no considerable bleeding (less than 10 ml) despite the high INR (more than 1.8 and less than 3.4 in 84 patients). All clinical parameters studied including arterial oxygen pressure, oxygen saturation, heart rate, blood pressure, the maximum airway pressure, and hemoglobin, remained unchanged or indicated an improvement.
**Conclusion(s):** The study indicated that using new and improved method of tracheostomy through larynx did not impose any difficulty in retrograde passage of guide wire as was reported in the classical Fantony method, and this procedure could also be safely conducted to patients with coagulation disorders( with INRs more than 1.8 and less than 3.4).
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## 11AP10-7

### Derived ROTEM parameters in end-stage liver disease. An insight into cirrhotic coagulopathy

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**Background and Goal of Study:** The re-balanced approach on hemostasis in End-Stage Liver Disease (ESLD) has changed the way we investigate and treat cirrhotic coagulopathy. Viscoelasting tests have become widely used in such patients, especially during the perioperative period. We hypothesize that derived ROTEM parameters may offer new information about the pathophysiological mechanisms of cirrhotic coagulopathy.
**Materials and methods:** 162 cirrhotic patients were prospectively included during a two year period: March 2013- March 2015. Collected data were: demographic data, etiology and severity of ESLD, liver functional tests, standard coagulation tests, platelet count and ROTEM parameters. Four ROTEM tests (ExTEM, InTEM, FibTEM, ApTEM) were performed on each patient and both standard (clotting time-CT, clot formation time-CFT, maximum clot firmness-MCF) and derived (thrombin potential index-TPI, maximum velocity of clot formation-MaxV, time to MaxV-MaxVt, area under the curve-AUC and maximum clot elasticity-MCE) parameters were recorded.
**Results and discussion:** Patients mean age was 54±12.6 years and mean MELD score was 19.19±6.27. INTEM CFT strongly correlated with AUC (p=0.003), MCE (p=0.001) and TPI (p=0.001). ExTEM CFT correlated with TPI (p=0.003) and we determined a cut-off value of 20 for ExTEM TPI below which ExTEM CFT rose exponentially. Platelet count correlated with ExTEM MCF (p=0.008), ExTEM TPI (p=0.000), MaxV (p=0.045) and MCE (p=0.000). We determined a cut-off value of 60000 for platelets below which ExTEM clot formation became significantly impaired and a cut-off value of 70000 below which clot elasticity significantly decreased.
**Conclusion(s):** Derived thromboelastometric parameters can offer a complex pathophysiological explanation of cirrhotic coagulopathy. Our results demonstrate the central role of platelets in determining clot strength and elasticity. The use of such parameters in clinical practice remains to be further evaluated.

## 11AP10-8

### SIRS, SEPSIS and TEG®

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**Background:** There is a lot of interest in the use of coagulation tests to diagnose hypo- and hypercoagulability in sepsis.
**Objective:** The objective of the study was to test whether thromboelastography (TEG®) -kaolin was able to detect an hypercoagulable state in comparison to thrombin generation test (TGT) and standard coagulation tests. Our main hypothesis was that patients would develop an hypercoagulable state.The original feature of our study design is the selection of participants at high risk of developing an hypercoagulability state with a close follow-up throughout a 7-days period in order to monitor the modification of TEG® profile.
**Method:** This is a monocentric prospective observational pilot study in a university hospital intensive care unit. We included all consecutive patients who undergone major general surgery (oesophagectomy or pancreatectomy) at high risk of post-operative SIRS or sepsis. We used the Thromboelastograph Analyser® for TEG and thrombin generation was measured with a calibrated automated thrombography system Fluoroskan Ascent Thermo® with 5 pM of tissue factor. Standard coagulation tests included PT, aPTT and fibrinogen. Patients were followed for 7 days at least. Ethical committee approval: 2013-A99107-38.
**Results:** 14 patients were included between March 2014 and October 2015. All patients received heparin (unfractionated or low molecular weight) for prophylaxis of venous thromboembolism. Mean TEG maximal amplitude was 63.8mm (5.84 SD) the first day and 72.29mm (11.5 SD) the last day with a high relationship with fibrinogen concentration. Mean alpha angle TEG was 67.82° (4.16 SD) the first day and 69.05° (7.28 SD) the last day. Mean endogenous thrombin potential (ETP) was 1923 nM.min(344 SD) the first day and 1803 nM.min (334 SD) the last day. Mean fibrinogen concentration was 2.9 g/L (0.67 SD) the first day and 6.7 g/L (1.90 SD) the last day. We observed 12 SIRS and 9 sepsis. There was 2 haemorrhagic events but no thromboembolic complication.
**Conclusions:** We observed significant variations of TEG® parameters whereas the ETP was constant throughout the study period. Our results suggest that TEG® changes mainly reflected the increase in fibrinogen level and and not an increase in thrombin generation and therefore an hypercoagulable state in patients with SIRS or sepsis.
**References:**
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## 11AP10-9

### The burn factor: importance of FXIII correction in a burn unit

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**Background and Goal of Study:** Surgical excision of burn injuries is frequently associated with severe bleeding. Concurring to this is the fact that major burn is often associated with dysfunction of the coagulation system. The XIII factor of coagulation (FXIII) promotes fibrin binding and its congenital deficit is associated with altered clot stability and impaired wound healing.
Strategies aiming to reduce hemorrhage and blood products requirements have an important role and recent focus has been given to optimization of the coagulation system, namely by the results of studies developed in the area of traumatic hemorrhagic shock.
We describe our experience with measurement and correction of FXIII level after the administration of recombinant FXIII (r-FXIII) in patients being submitted to surgical excision of burn wounds and skin grafting in our Burn Unit.
**Materials and methods:** Retrospective study of patients submitted to surgical burn wound debridement and skin grafting in our Burn Unit. Analysis of the Burn Unit's database - measurement of hemoglobin and hematocrit level, standard coagulation tests and FXIII level, pre-operatively, intra-operative and in the immediate post-operative period. Blood products requirements were registered.
**Results and discussion:** In 2015, 9 patients with mean total body surface area of 31.05% (6 of which also with evidence of airway burn) were screened for FXIII deficiency. The mean number of surgeries per patient was 2 (minimum of 1 and maximum of 6) and the measurement of FXIII was 46.47% and 58.75%, pre and postoperative respectively. During the surgery, a mean of 1.9 Red Blood Cell (RBC) Units and 3.335 of fresh frozen plasma (FFP) were administered; platelets and fibrinogen were administered only to 1 patient, guided by TEG monitoring. No complications were associated with its administration; in particular there was no record of thrombotic events. There was a significant reduction in the blood products requirements in comparison to the literature and to our previous experience. It was more evident in RBC units than FFP units due the protocol of FFP administration used in our Unit.
**Conclusion(s):** The use of rFXIII might be useful in decreasing hemorrhage and thus blood transfusion requirements in major burn patients, without compromising skin grafting. Further studies in larger scale are needed to confirm this hypothesis.

## 11AP10-10

### Propofol infusion for treatment of serotonin syndrome in self-ventilating patient

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**Background:**
• Severe serotonin syndrome is a potential life threatening condition. Along with medications, the patients will often need intubation and ventilation in ICU.
• Aid practitioners in the management of Serotonin syndrome.
**Case report:** 53 year old male patient, admitted to haematology unit as a case of Graft Vs Host Disease. Background of AML & Psychiatric history, where he required Quetiapine 175mg/day

Patient was complaining of nonspecific chest pain, and he was given Tramadol two doses over one night for pain relief, when he started to be confused, agitated and diaphoretic, followed by tremor, spontaneous clonus and Temp of 38.5C. Patient was given Benzodiazepine which didn't settle him, ICU team was called to review him, and he was found to fulfill Hunter Criteria of Serotonin Syndrome - severe presentation.
Patient was transferred to ICU. On arrival, he was tachypnic, tachycardic, hypertensive, Temp 38.5C, agitated with induced and spontaneous clonus and tremor. Inflammatory markers and CK level were within normal range.
Propofol bolus dose was given 1mg/Kg IV which settled his agitation and tremor followed by propofol infusion 1mg/Kg/hr, and within short time pt was awake and normothermic. Propofol infusion continued for less than 24 hrs, and pt was discharged from ICU in less than 36hrs, during this pt stayed self-ventilating and didn't require any kind of airway or breathing support.
**Discussion:** Serotonin syndrome is caused by increased serotonergic activity in CNS. Serotonin syndrome is characterized by triad of neuromuscular excitation, autonomic stimulation and changed mental state1. It can happen with therapeutic medication use, inadvertent interactions between drugs, and intentional self-poisoning 2. The way how Propofol works to treat serotonin syndrome is not fully understood. Very small number of case reports had used propofol in the treatment of Serotonin syndrome3 4 5, In this report we used propofol infusion to treat awake Pt with complicated Hx.
**References:**
1. Serotonin toxicity, MJA 2007; 187 (6): 361-365
2. The serotonin syndrom, N Engl J Med. 2005;352(11):1112
3. Recovery from serotonin syndrome after the use of proposal,EJA 2012 (29):137
4. Life-threatening serotonin syndrome following a single dose of a SSRI, PMID: 2006. 16733986
5. Fentanyl/fluoxetine/pethidine interaction, SpringerLink July 2013 (1459): 1, 20-20
**Learning points:** Propofol can be used for treatment of serotonin syndrome.

## 11AP10-11

### Predictors of severe alcohol withdrawal syndrome in hospitalized patients

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**Background and Goal of Study:** Alcohol addiction is present in up to 20% of hospitalized patients [1] and alcohol withdrawal syndrome (AWS) may often complicate hospitalization course. The goal of this study was to determine predictors of severe AWS course in hospitalized AWS patients. This may decrease incidence of AWS under treatment as well as over treatment.
**Materials and Methods:** 336 patients were admitted to this observational prospective study. Inclusion criteria were as follows: age from 18 to 75 years; a diagnosed state of alcohol withdrawal in accordance with the DSM IV criteria (Diagnostic and Statistical Manual of Mental Disorders, 4th Edition criteria); an informed consent to participate in the study, signed by the patient or his legal representative. Exclusion criteria were as follows: age under 18 and over 75 years; inability to obtain an informed consent from the patient or his legal representative; a state of withdrawal of other psychoactive substances; pregnancy or lactation. Multivariable binary regression models with stepwise selection procedures were conducted providing odds ratio (OR) estimates.
**Results:** In the multivariable regression, significant predictors of severe AWS were: history of AWS [OR: 29; 95% confidence interval (CI): 14-68; p=0,001]; history of AWS seizures [OR 4; 95% CI: 1,3-16; p=0,008]; history of other psychoactive drugs (e.g. benzodiasepines, opioids) used [OR 3; 95% CI: 1,3-10; p=0,04]; tachycardia [OR 5; 95% CI: 3-11; p=0,0001]; trombocytopenia [OR 3; 95% CI: 1,5-7]; liver cirrhosis class B [OR 8; 95% CI: 1,1-344; p=0,04] or C by Child-Pugh [OR 4; 95% CI: 1,1-21; p=0,03].
**Conclusions:** In this large prospective study we determined the predictors of severe AWS course in hospitalized patients: history of previous AWS or AWS seizures, history of other psychoactive drugs (e.g. benzodiasepines, opioids) used, tachycardia (over 110 beats p.m.) or thrombocytopenia (under $100*10^3$mk/L) on admission, liver cirrhosis class B or C by Child-Pugh. These patients require early hospital admission, careful AWS symptoms assessment and timely start of symptom triggered therapy.
**Reference:**
1. Rayner SG, Weinert CR, Peng H, Jepsen S, Broccard AF. Dexmedetomidine as adjunct treatment for severe alcohol withdrawal in the ICU. Ann Intensive Care 2012; 2(1):12.

## 11AP11-1

### Detection of fibrinolysis by quartz crystal microbalance

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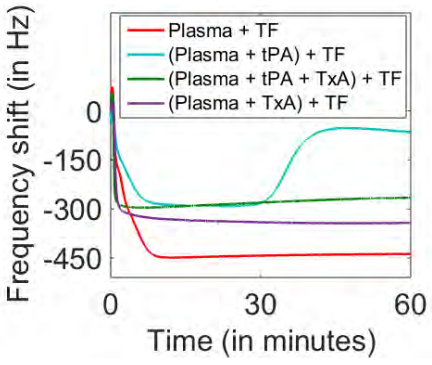
**Background and Goal of Study:** The Quartz Crystal Microbalance (QCM) has been shown experimentally to be sensitive to coagulation[1]. Resonant frequency changes reflect mass loading of the device with clot and are reminiscent to results from thromboelastography (TEG). The QCM is a compact device that may be more robust than TEG. Fibrinolysis is clinically important and a simpler assay may be helpful in individualizing this treatment. We investigated the sensitivity of QCM to fibrinolysis.
**Materials and methods:** Plasma (P) was prepared by centrifugation of citrated healthy volunteer blood. 80μL aliquots were loaded onto a QCM sensor. Normal coagulation was initiated with 160μL of prothrombin time reagent (TF) and QCM frequency measured with time. To investigate the effect of hyperfibrinolysis and its antagonism, the plasma was pre-treated with the addition of 40IU of (tPA) urokinase (1IU/μL), 40μg of tranexamic acid (TxA) or both before adding TF.
**Results and discussion:** Resonant frequency change with time is shown in the figure.



*[Figure. QCM curves: Frequency changes vs time]*

Normal coagulation (P+TP) showed a drop in resonant frequency as clot is coupled to the resonator. tPA addition gave a recovery in frequency towards baseline indicating hyperfibrinolysis. Addition of TxA restored a normal coagulation profile but with a smaller maximum change confirming its anti-fibrinolytic effect. TxA also increased the initial rate of drop in resonant frequency even without tPA.
**Conclusion:** We show that the QCM can detect changes in fibrinolysis. The effect of TxA on the initial rate of frequency drop suggests sensitivity of the device to intrinsic fibrinolysis in normal plasma. Furthermore the speed of this initial effect suggests that this may form the basis for a more rapid assay of fibrinolysis than TEG, which is intrinsically slow. Such an assay would be clinically very useful, although further studies are warranted.
**Reference:**
1. Müller L, et al. Investigation of prothrombin time in human whole-blood samples with a quartz crystal biosensor. *Anal Chem 2010; 82: 658-63.*

## 11AP11-2

### Agreement and clinical interchangeability of the TEG®6s haemostatic analyser between devices, operators, and across multiple time points: a comprehensive prospective validation study

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**Background and Goal of Study:** TEG®6s (Haemonetics Corp, USA) is a novel haemostasis analyser that measures viscoelasticity properties of blood using resonance technology. We assessed agreement of the TEG®6s analyser between devices, operators, and across multiple time points.
**Materials and methods:** We collected 3.5mL whole blood in citrated tubes from 25 adult patients in a tertiary level intensive care unit (ICU). Measurements were performed by one operator on two TEG® 6s devices ("*Interdevice"* agreement). Then, 5 different operators performed sample analysis from 5 healthy volunteers, using 5 TEG6S devices ("*Interoperator"* agreement). Finally, a single operator performed 15 measurements on 4 TEG®6s devices, with samples from 5 healthy volunteers, 5 surgical, and 5 ICU patients. Agreement across pre-set time points (0, 15, 60, 120 and 180 minutes) ("*Timepoint"* agreement) was examined. "*Interdevice"* agreement was estimated using Lin's condordance coefficient and further validated using intraclass correlation coefficients and reduced major axis regression. "*Interoperator" and "Timepoint"* agreement was assessed using the Intraclass correlation coefficient estimated by a random effect regression model.
**Results and discussion:** Almost perfect "*Interdevice*" agreement was observed, pervasive across all TEG variables. Lin's concordance correlation coefficients (95%CI, slope, intercept) were R-time: 0.96 (0.92-0.99, 0.88, 0.57); K-time: 0.93 (0.87-0.98, 1.07, 0.00); Alpha Angle: 0.87 (0.78-0.96, 1.20, -14.10); Maximum Amplitude (MA): 0.99 (0.98-0.99, 1.02, -1.38); Clot Lysis (LY30%): 0.89 (0.82-0.97, 1.20, 0.07). "*Interoperator"* agreement was almost perfect for MA and LY30%, substantial for R-time, moderate for K-time, and slight for Alpha angle. The Intraclass correlation coefficients (95%CI) were R-time: 0.61 (0.21-0.99); K-time: 0.51 (0.12-0.88); Alpha Angle: 0.13 (0.00-0.91), MA: 0.84 (0.58-1.22), LY30%: 0.93 (0.78-0.99). Finally, across timepoints we observed near perfect agreement for R-time, MA and LY30%, and substantial agreement for all other variables. The Intraclass correlation coefficients (95%CI) were R-time: 0.81 (0.66-0.91); K-time: 0.67 (0.48-0.85); Alpha Angle: 0.61 (0.39-0.80), MA: 0.96 (0.91-0.98), LY30%: 0.80 (0.61-0.91).
**Conclusions:** The TEG®6S platform was broadly clinically interchangeable between devices and across time points with near perfect agreement. "*Interoperator*" agreement was acceptable for all variables except for Alpha Angle.

## 11AP11-3

### Management of pregnancy with HELLP syndrome, eclampsia, and intracranial bleeding in intensive care unit emergency department in developing country

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**Background:** In developing countries, a woman is 7 times as likely to develop preeclampsia than in a developed country. From 10-25% of these cases will result in maternal death (1). In our hospital, preeclampsia/eclampsia cases are often met.
**Case report:** A 34 years old woman, multigravida, with 37-38 weeks of gestational with eclampsia, HELLP syndrome, and intracranial bleeding. Manifestations were headache, nausea, vomitting and epigastric pain. Initial examination showed dyspnea and hypertension (BP 220/110 mmHg). Neurological examination found GCS 4-5-6, anisocore pupil, lateralization, speech dysarthria, and face and extremities edema. After 2 period of seizures, she was intubated. CT-Scan revealed intracranial bleeding with severe cerebral edema. She underwent C-Section and craniotomy. The operation lasted 8 hours and 45 minutes (45 minutes for C-Section). She then admitted to the ICU with cerebral edema, anemia, thrombocytopenia, hypertension, and risk of seizures. Patients were mechanically ventilated for 9 days with VAP Prevention Bundle, negative fluid balance for 3 days using manitol, antihypertensive agents to reach BP of 140-160/90-100 mmHg, analgesia using morphine, transfusion of PRC to reach Hb above 10g/dl and also thrombocyte concentrate transfusion. After 10 days, patient was stable and transferred to ward with GCS 4-5-6 and left lateralization.
**Discussion:** The prevalence of preeclampsia at Dr Soetomo general hospital Surabaya in 1996-2001 were 0.81-1.08% (2). Maternal mortality rate was 4.2% with 50% of eclampsia happened antepartum. In 2014, we handled 83 cases of severe preeclampsia/eclampsia. Out of 83, 35 were eclampsia, and only 4 were with intracranial bleeding. Even with high mortality rate, due to a good team work within the emergency department, the patient can be saved with minimal neurological deficit.
**References:**
1. Maternal mortality in 2005: estimates developed by WHO, UNICEF, UNIFPA and the World Bank, Geneva, World Health Organization, 2007
2. Wahjoeningsih S. Anesthesia pada pasien dengan preeclampsia-eklamsia. In: Proceeding Book 1st Indonesian Symposium pediatric anesthesia and critical care. Surabaya. 2005. P95-104
**Learning points:** Fast responses time from emergency room and operating theatres, followed by good ICU management supported the good outcome. Good team work and communication from obstetritician, anesthesiologist, surgeon, and intensivist were the key. Fast responses time can brought success and save one live from eclampsia, even complicated with an intracranial bleeding.

## 11AP11-4

### Confusion, respiration, blood pressure and $SpO_2$ evaluation and CRB-65 score estimation in prediction of severity of state and outcome in pregnant with complicated influenza or influenza like infection

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**Background and Goal of Study:** Influenza is complicated with the developing of pneumonia in pregnant and accompanying with high level of mortality. CRB-65 score identify patients which need hospitalisation or ICU admission for CAP and include age, mental status, respiratory rate (RR >30), blood pressure ($BP_{syst}$ <90 and/or $BP_{diast}$ ≤60). We estimate it could be informative in pregnant during influenza epidemic as well.
**Materials and methods:** During the epidemic of influenza A(H1N1) in Ukraine in October-December 2009, aprox. 3000 pregnant were hospitalised, aprox. 300 of them treated in ICU and 53- died (49 case notice were available for analysis). For analysis we collected data from 49 patients who died (retrospectively), selected matched 26 pregnant who treated in ICU and survived and 110 pregnant with ILI and influenza who were hospitalized but didn't require ICU admission. To evaluate CRB-65 validity in pregnant with Influenza we spread our data on a population. We calculated sensitivity, specificity, of each parameter, including $SpO_2 \leq 94\%$ and analysed discriminatory power of predictive rules (CRB-65 and CRB-65+$SpO_2$) using the area under (ROC) curve of this scale to predict hospital mortality in pregnant.
**Results:** Pregnant from all groups were similar by age, gestation and type of infection, patients which treated in ICU were similar also in time of call for medical care and time of hospitalization from the beginning of disease. Pregnant which didn't treated in ICU during hospitalisation achieved 0 or 1 point according CRB-65 score (because of hypotension in all 14 cases). For BP <90 mmHg sensitivity was 36,7%, specificity - 86,8%. Flag point for transferring to ICU was SpO2 ≤94% has sensitivity 84,4%, specificity-95%. We find what RR ≥25/min (but not 30 as in CRB65) had also high sensitivity 61% and specificity 94,9%. During hospitalisation only 18 pregnant from group of died had altered mental status (sensitivity 14,6%). AUC for "2 points" of CRB-65 scale was estimated as fair (0,786) for predicting mortality in pregnant. After adding additional parameter to scale CRB-65 (SpO2≤ 94%) prognostic value increased to "good" level (AUC 0,868).
**Conclusion:** No single parameters except $SpO_2 \leq 94\%$ could be an independent predictor of mortality in pregnant with influenza. CRB-65 score can be used in pregnant with influenza or influenza like illnesses for identification of high risk patient with including SpO2 ≤ 94% and with referent point "2" for ICU admission.

## 11AP11-5

### Maternal complications of severe preeclampsia in a level III University Hospital

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**Background and Goal of Study:** In the recent years, the incidence of some conditions considered risk factors for preeclampsia have increased: obesity, hypertension, assisted reproductive technology (ART) and multiple gestation. This may have influenced prognosis of severe preeclampsia (SP). The goal of study was to analyze maternal complications of SP in a level III University Hospital.
**Materials and methods:** With approval from the Local Ethics Committee, a prospective observational study of women with SP admitted to a high dependency unit in a level III University Hospital, from 2010 to 2012, was performed. SP was established according to international criteria[1]. The following complications were studied: obstetric hemorrhage (>500 ml after vaginal delivery or > 1000 ml after caesarean section), renal dysfunction (serum creatinine >1.2 mg/dl), hepatopathy (AST/ALT ≥70 IU/L), HELLP syndrome, "*placental abruption*", pulmonary oedema, perinatal death (≥20 weeks of gestation to the first 7 days of life) and eclampsia.
**Results and discussion:** 276 cases were analyzed. 17.3% (n=47) of patients were obese, 16.7% (n=46) had a multiple pregnancy, 16.3% (n=45) had been undergoing ART and 8.7% (n=24) had chronic hypertension.
42.7% (n=118) of patients developed at least one complication. The incidence of maternal complications was: obstetric hemorrhage 17.4% (n=48), renal dysfunction 11.2% (n=31), hepatopathy 8.3% (n=23), HELLP syndrome 6.5% (n=18), "*placental abruption*" 5.8% (n=16), pulmonary oedema 5.1% (n=14), perinatal death 3.6% (n=10) and eclampsia 1.8% (n=5). Perinatal death was more frequent in women with chronic hypertension (12.5%, n=3 *vs* 2.8%, n=7 normotensive, p=0.046), early-onset disease (<34 weeks) (10.8%, n=9 *vs* 0.5%, n=1 late, p<0.001) or pathological uterine artery Doppler (10.5%, n=6 *vs* 0%, n=0 normal, p<0.001).
Obstetric hemorrhage and pulmonary oedema were more frequent than those reported in the literature, perhaps due to the prospective design and the high percentage of multiple pregnancies and early-onset forms (30.1%, n=83). Perinatal mortality rate was slightly lower, probably because of the realization of the study in a national reference neonatal intensive care centre.
**Conclusion(s):** The most frequent complications were obstetric hemorrhage and renal dysfunction. Early-onset preeclampsia was associated with higher perinatal death rate.
**Reference:**
1. Steegers EA, von Dadelszen P, Duvekot JJ, et al. Lancet. 2010; 376: 631-44.

## 11AP11-6

### A 28 year-old pregnant woman with pancreatic adenocarcinoma: a case report

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**Background:** Pancreatic tumors are rare in pregnancy but can be life threatening for mother and fetus. Mass of the tumor can cause intrauterine growth restriction, compression of surrounding structures, pancreatitis. Diagnostic procedures and treatment methods represent a great challenge. Even greater challenge is delivery of a healthy infant who is developing normally.
**Case report:** A 28 year-old woman at 21 weeks gestation presented with abdominal pain. Prenatal evaluation and ultrasounds had all been normal and tocolysis was initiated. Because of persistent pain gastroenterologist was consulted. Abdominal ultrasound revealed an abdominal mass and MRCP was indicative of pancreatic head tumor 6 cm in diameter. A nonresectable pancreatic tumor was found on surgical exploration and biliodigestive anastomosis was performed. After a few days patient's condition worsened with signs of peritonitis and second operation was performed. Surgical exploration revealed bile duct leakage which was treated with sutures. Patient was admitted to ICU. CVP and invasive blood pressure were monitored, antibiotics, parenteral nutrition and continuous epidural analgesia initiated. A multidisciplinary council including oncologist, obstetrician and anesthesiologist-intensivist estimated risks and benefits to the patient and the fetus. She agreed to chemotherapy with gemcitabine. Soon patient developed cardiac decompensation and responded well to diuretic therapy. Paralytic ileus was treated with neostigmine and metoclopramide. Haemoculture was positive for C. albicans and amphotericin B was started. Due to intense pain very high doses of intravenous opioids where added. Obstetric ultrasound revealed oligohydramnios. Medical council decided to perform a cesarean section at 28 weeks of gestation. Patient was discharged home 16 days later. Mortal outcome occurred a month later. Two months after birth infant had developed normally.
**Discussion:** Endoscopic/abdominal ultrasound and MRI are the preferred diagnostic methods in pregnancy. The decision on treatment of pancreatic tumors depends on gestational age, staging of the tumor and the patients choice.
**Reference:**
1. Boyd CA, Benarroch-Gampel J, Kilic G, et al. Pancreatic neoplasms in pregnancy: diagnosis, complications, and management. J Gastrointest Surg. 2012;16(5):1064-1071
**Learning points:** Meticulous diagnostic assessement, management of complications and treatement planning are crutial for mother and/or fetus prognosis.

## 11AP11-8

### Higher mortality of obese septic critically ill patients

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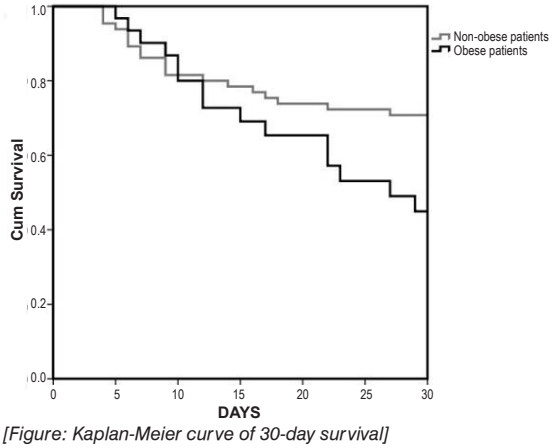
**Background and Goal of Study:** The effect of obesity on mortality of critically ill septic patients remains controversial.
The objective of this study was to assess the correlation between obesity and mortality of septic patients admitted in the Intensive Care Unit (ICU).
**Materials and methods:** All septic patients admitted in the ICU of the University Hospital of Patras, Greece during a 28 month period were included. Data were prospectively recorded in the ICU computerized database.
**Results and discussion:** Of the 502 patients admitted during the study period, 96 (19%) were septic upon ICU admission. Among them, 30 (31%) were obese. ICU mortality of the 96 septic patients was 49%. Multivariate analysis revealed that obesity (P 0.003; OR 5.3; 95% CI 1.8-15.9), SAPS II upon ICU admission (P 0.018; OR 1.0; 95% CI 1.0- 1.1) and development of severe sepsis or septic shock (P 0.015; OR 3.4; 95% CI 1.3-9.1) were all independently associated with mortality. Figure depicts a Kaplan-Meier curve of 30-day survival probability of ICU patients according to the presence of sepsis and obesity. The comparison between obese and non-obese patients revealed that obesity was associated with mortality (P 0.021; OR 3.4; 95% CI 1.2- 9.3) and number of catheters (P 0.001; OR 2.1; 95% CI 1.3- 3.2)



*[Figure: Kaplan-Meier curve of 30-day survival]*

**Conclusion(s):** The obesity paradox (lower mortality of obese patients) was not observed among ICU septic patients. Sepsis upon ICU admission is adversely influenced by obesity.

## 11AP11-9

### Does the postoperative analgesia affect morbidity in bariatric surgery? A single-centre retrospective review

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**Background and Goal of Study:** This study aimed to investigate a possible relationship between different acute-pain analgesic therapies and postoperative morbidity and mortality in bariatric surgery.
**Materials and methods:** This was a retrospective observational study of patients (n = 60) who underwent laparoscopic sleeve gastrectomy following a protocol from 2014 to august 2015. The subjects were classified into 4 groups according to different analgesic therapies for acute postoperative pain: A - intravenous morphine infusion (1.5 mg/h; n = 18); B - intravenous tramadol (100 mg every 8 h; n = 14); C - intravenous NSAIDs (dexketoprofen 50 mg every 8 h; n = 13) and D - epidural fentanyl/levobupivacaine infusion (fentanyl 2 mcg/ml; levobupivacaine 0.125%; 8 ml/h; n = 15). Postoperative complications were considered as the primary endpoint. Moreover, the following parameters were recorded: demographic characteristics, Body Mass Index (BMI), ASA, URPA stay, ICU stay and total hospital stay. The study was carried out after the approval of the Hospital Ethic Committe. The data were analyzed with 95% confidence by SPSS20, using descriptive-analytic statistics (Fisher's Exact Test, Kruskall-Wallis Test).
**Results and discussion:** A total of 60 sleeve gastrectomies were performed. Morbid obesity prevalence in the sample was higher in women (65%). However, groups can be considered demographically homogeneous. With regard to hospital length of stay (URPA stay, ICU stay and total hospital stay) there were no statistically significant differences among analgesic therapies ($p1 = 0.161$; $p2 = 0.194$; $p3 = 0.367$). The incidence of postoperative nausea or vomiting was higher in intravenous-opioid therapies (11% tramadol; 16% morphine). Two cases of gastrointestinal perforation (1 in A who finally died, 1 in D), two events of haemoperitoneum (1 in A, 1 in B) and one episode of intra-abdominal abscess (D) were described in the sample.
**Conclusion:** The optimal acute-pain analgesic treatment after bariatric surgery remains unclear. None of these therapies has shown to increase morbidity, mortality or length of hospital stay in the sample. Therefore, it is a multiple-choice question with several correct answers. Nevertheless, we need a larger sample size to obtain new conclusions. The integration of multimodal analgesia techniques with a multidisciplinary rehabilitation program in bariatric surgery may enhance recovery, reduce hospital stay, and facilitate early convalescence.

## 11AP11-10

### Title: Accuracy and followership of respiratory rate obtained from plethysmograph of pulse oximetry (Nellcor™ Bedside Respiratory Patient Monitoring System, PM1000N, COVIDIEN®)

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**Background and Goal of Study:** Respiratory rate (RR) is one of the important physiological parameters that determine the general condition, particularly for the patients who are expected to have respiratory muscle fatigue, administered opioids, or sedated. Currently, a device that can monitor continuous RR is clinically available (Nellcor™ Bedside Respiratory Patient Monitoring System,PM1000N, COVIDIEN®), analysing the plethysmograph waveform fluctuation obtained from pulseoximeter. The aim of this study was to evaluate the feasibility and usefulness of this device.
**Materials and methods:** Inclusion criteria; Patients who underwent surgery on general anesthesia with spine position (Group1), patients admitted in high care unit (Group2), and healthy volunteers (Group3). We defined four RR as follows, rrV; RR on mechanical ventilator while sedated, rrI; RR obtained from ECG impedance, rrM; RR healthy volunteers were forced to breath accompanied with metronome rhythm, rrP; RR obtained from plethysmograph. We evaluated a gap between rrR/rrI and rrP, and the time required from rrM/rrV had changed to rrP catched up with.
**Results and discussion:** RrP represented perfectly the same number with rrV in Group1(n=10,8≤RR≤16).No significant difference was seen between rrI(mean 19.73±SD4.76) and rrP (mean19±SD4.19) (n=23,P=0.579). When rrV was varied 10 to 16, 16 to 10, mean T were 51.16±SD 5.67, 79.5±SD 29.3 seconds, respectively in Group1 (n=7). We tried to investigate when rrV was varied 10 to 0, it required more than 2 minutes to rrP reached 4 (the minimum RR the device can display). We reconciled this reseach considering patients safety. When rrM were changed from 10 to 6, from 6 to 15, and from 15 to 30, the mean T was 82.33, 64.66, and 96 seconds respectively in Group3 (n=6). In ideal conditions such as under general anesthesia, we showed rrP was accurate. These facts showed that the device was useful for patients with respiratory depression, tachypnea. However, we showed it takes more than 60 seconds until the rrP catch up with actual RR. Under room air inhalation, SpO2 drops within 60 seconds from respiratory arrest. This device might not be much useful than SpO2 for the respiratory arrest patients such as airway obstruction.
**Conclusion:** RrP showed almost equal number to rrV/rrM under ideal conditions. However, it took a lot of time to rrP catched up with rrV/rrM. We should adapt this device for selective patients. We make plans to continue this study for large number of subjects.

## 11AP11-11

### Surgical Pleth Index (SPI) as a tool for monitoring depth of analgesia and sedation in critically Ill patients

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**Background and Goal of Study:** Guidelines point out the importance of adequate analgesia and sedation in intensive care patients [1]. The Surgical Pleth Index (SPI), a monitoring variable of analgesia, is calculated from regular non-invasive pulseoximetry and showed a correlation with noxious stimulation and opioid concentration during general anaesthesia [2]. However, data regarding critically ill patients are still missing and therefore we examined the ability of SPI to monitor analgesia and sedation in this clinically important patient group.
**Materials and methods:** After obtaining approval of the institutional ethics committee and written informed consent of patients or accountable relatives, 50 sedated and ventilated intensive care patients as well as 10 healthy awake volunteers were enrolled.
Data of SPI, heart rate, blood pressure, oxygen saturation, Bispectral Index (BIS) and Spectral Entropy (RE/SE) as well as Ramsay Sedation Scale (RSS), Richmond Agitation and Sedation Scale (RASS) and Behavioral Pain Scale (BPS) were collected before and after application of a standardized noxious stimulus (strong squeeze on fingernail). For statistical analysis Mann-Whitney test and Spearman correlation coefficient were calculated.
**Results and discussion:** Whereas, we detected a significant stimulation induced change in the SPI values (p=0,012) from (mean±SD) 47,2±18,94 to 60,3±18,06 in the group of healthy awake. We could not detect a significant difference (p=0,08) from 49,96±16,54 to 52,1±15,72 of SPI values in group of critically ill patients. We detected only a low correlation between the SPI and RE/SE or BIS after stimulation. There was no correlation between the SPI and haemodynamics, BPS or clinically sedation scores RSS or RASS in critically ill patients.
**Conclusion(s):** Contrary to healthy awake volunteers, the SPI was not altered by noxious stimulus in critically ill patients. Neither, we could detect a correlation of SPI with available clinical scores of analgesia and sedation. Taking the current results, measurement of SPI is not suitable for monitoring depth of analgesia or sedation in critically ill patients.
**References:**
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## 11AP12-1

### Incidence of nosocomial pneumonia and postoperative pulmonary complications in patients undergoing lung resection surgery in our critical care unit: analysis of risk factors

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**Background and Goal of Study:** Nosocomial pneumonia remains important causes of morbidity and mortality despite advances in the use of preventive therapies. It is defined as pneumonia that occurs 48 hours or more after admission, which was not incubating at the time of admission. Moreover, patients undergoing lung resection are thought to be at high risk for the development of postoperative pulmonary complications.
The goal of our study was to determine the incidence and risk factors of nosocomial pneumonia in patients undergoing lung resection surgery, identify the predominant postoperative pulmonary complications and possible associated risk factors.
**Materials and methods:** After ethical committee approval, an analytical, observational, retrospective, cohort study was carried out in patients underwent lung resection surgery. A total of 50 patients were included in the study. Several variables were studied: age, gender, creatinine, hypertension, COPD, smoking, diabetes, dyslipidaemia, ASA classification, lesion location, kind of resection, anesthesia type, crystalloid and colloid volumes, one-lung ventilation tolerance, hospitalization time, development of nosocomial pneumonia, postoperative pulmonary complication and mortality.
**Results and discussion:** The incidence of nosocomial pneumonia was 4% in patients underwent lung resection surgery. The most common chronic diseases were COPD (38%), hypertension (32%), DM (8%), liver disease (8%), congestive heart failure (6%) and neurological disease (6%). The mortality was 2%. 50% of patients who developed nosocomial pneumonia died. There were not any associated risk factors with statistically significant relationship with the development of nosocomial pneumonia. Pulmonary complications were found in 28% patients. The main complications were respiratory failure (12%); atelectasias on chest X ray (10%), pleural effusion (6%) and acute respiratory distress syndrome (2%). Age ($p<0.05$), diabetes ($p<0.05$) and hospitalization time ($p<0.001$) were related to pulmonary complications.
**Conclusion(s):** Nosocomial neumonia in patients undergoing lung resection surgery is a common problem with an important mortality in our CCU. The potential deleterious effects on outcome increase the importance of specific measures for infection control in critically ill patients. Perioperative optimization of these high-risk patients may decrease postoperative pulmonary complications and related costs for healthy services.

## 11AP12-2

### Efficacy of a tracheal-tube fixation device for prevention of ventilator-associated pneumonia: a prospective randomized controlled study

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**Background and Goal of Study:** Recently, several types of tracheal-tube fixation devices have been used in clinical practice. However, the details of the relationship between tracheal-tube fixation devices and the complications of mechanical ventilation were unclear.
This study evaluates whether a novel tracheal-tube fixation device can prevent ventilator-associated pneumonia (VAP) with intubated patients in intensive care units.
**Materials and methods:** With institutional review board approval, we performed a prospective, randomized, and controlled study. Patients who were intubated and undergoing mechanical ventilation were randomly divided into two groups: a control group, which used adhesive tape and the traditional method for tube fixation, and an anchor group, which used Anchor Fast as a device for securing the endotracheal tube. Standard oral care, including tooth brushing three times a day, was performed for all patients. After the third post-intubation day, a clinical diagnosis of VAP on the basis of fever, purulent sputum, leukocytosis, and infiltrate visible on a chest x-ray was evaluated. Once the clinical diagnosis of VAP is made, patients should have a tracheal aspirate collected for culture to evaluate the microbiologically confirmed VAP.
**Results and discussion:** Two hundred and thirty-nine patients who satisfied the criterion for our study were evaluated. There were no significant differences between the control group ($n = 111$) and the anchor group ($n = 128$) in terms of patient characteristics, severity score, duration of endotracheal intubation, and length of hospital stay. The incidence rate of oral mucocutaneous lesions after tracheal intubation was significantly lower in the anchor group than in the control group (28.9% vs. 57.6%, $P < 0.0001$). The incidence rate of the clinical diagnosis of VAP was significantly lower in the anchor group than in the control group (16.4% vs. 30.6%, $P = 0.0133$). The incidence rate of the microbiological VAP was also significantly lower in the anchor group than in the control group (12.5% vs. 27.9%, $P = 0.0033$). There were no differences in 28- and 60-day mortality rates between the groups.
**Conclusion:** Anchor Fast was effective for the prevention of VAP. Using Anchor Fast to ease oral management and prevent oral mucocutaneous lesions might decrease the incidence rate of the VAP.
**Acknowledgements:** We would like to thank the ICU staff who supported and participated in the study.

## 11AP12-3

### The effect of the methanol leaf extract of the plant *Azadirachta indic*a (Neem) on the most common bacterial causes of ventilator associated pneumonia

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**Background and Goal of Study:** Ventilator associated pneumonia (VAP) is the most common pneumonia in the surgical intensive care units (SICU). Studies in patients suggest that oral care can reduce the incidence of VAP in the SICU up to 90 %. Modern pharmacology confirms numerous biological effects of Neem, including its antibacterial effect.
The study was aimed to determine the effect of methanol extract of Neem leaves on the most common oral bacterial pathogens which cause VAP and therefore the rationale of its use for oral care at SICU patients on mechanical ventilation and the prevention of VAP.
**Materials and methods:** The agar dilution method was used and the methanol extract of Neem leaves (FNWL, Natural Sourcing, Oxford, CT, USA) in the concentrations of 0,25%, 0,50%, 1%, 2%, 5% and 10% was added to Müller-Hinton agar before its solidification. The dry matter in the extract was 4,31±0,19 g/100mL. The effect of extract on bacterial growth was studied on the suspension of clinically isolated bacteria: *Staphylococcus aureus, MRSA (SCCmec I-V), Acinetobacter baumannii, Klebsiella pneumoniae, Pseudomonas aeruginosa* and *Stenotrophomonas maltophilia* (quantity 10 $\mu$L, density $10^5$ and $10^8$ CFU/mL), after the incubation of 24 h in the aerobic conditions at 37 °C. The results were read off as the smallest dilution concentrations of the extract which have had inhibitory effect on bacterial growth with microdilution method with automatic record. All experiments were done in triplicate, and as the control served the plates with 96 % methanol.
**Results and discussion:** Methanol leaf extract of the *Azadirachta indica* (Neem) inhibited growth of the *Staphylococcus aureus* and *MRSA* at concentrations of 10 % and 5 %, respectively, while there was no bacteriostatic effect on the other bacteria in this experiment. This difference could be explained by the distinction in the characteristic lipopolysaharide wall layer of Gram negative bacteria so the Neem extract could take the effect through the periplasmatic space. Considering its effect on MRSA, Neem could be a promising source of a new antiMRSA drug and further research is required.
**Conclusion:** Methanol extract of the plant *Azadirachta indica* (Neem) has no effect on the majority of the most common oral bacterial causes of VAP, except for *Staphylococcus aureus* and *MRSA* and therefore is not suitable for oral care of SICU patients on mechanical ventilation and thus the prevention of VAP.

## 11AP12-4

### Postoperative pneumonia in a surgical intensive care unit: a retrospective cohort analysis

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**Background and Goal of Study:** Postoperative pneumonia (POP) is a frequent complications in the postoperative setting. Infections with multidrug-resistant (MDR) strains are associated with increased in-hospital mortality. Identification of patients at risk for MDR pathogens could facilitate empiric antibiotic decisions.
The aim of the study is to describe the microbiology of POP in a surgical intensive care unit (SICU) and to analyse the effectiveness of the therapeutic measures introduced after the analysis of our data.
**Materials and methods:** We retrospectively analysed all patients with clinical suspect of POP admitted in our SICU in 2015. Most important variables analysed were: time onset of POP (early or late), risk factors for MDR pathogens, microbiology and antibiotic susceptibility.
According to our previous results we implemented and reinforced evidence-based measures (hand hygiene, sampling of environmental surfaces, bacterial filters) to control the transmission of MDR pathogens. We also established a new empirical antibiotic protocol for patients with POP and risk factors for MDR pathogens. Antibiotic policy was: meropenem+amikacin+nebulized colistin due to a high incidence of MDR *Ps.aeruginosa* (only susceptible to colistine and amikacin) and extended-spectrum beta-lactamase-producing (ESBL).
**Results and discussion:** 27 patients (78% male) with an average age of 71(31-92) years had at least one episode of POP. Of the total of POP, 29% were not microbiologically documented. We observed a decrease in the incidence of MDR Ps. aeruginosa although the percentage of ESBL remains the same. Incidence of MRSA remains negligible. All MDR pathogens isolations occurred in patients with risk factors.

| | 2014 | Early-onset (n) | Late-onset (n) | | 2015 | Early-onset (n) | Late-onset (n) | |
|---|---|---|---|---|---|---|---|---|
| **No-MDR** | Ps.Aeruginosa | 5 | 4 | 16% | | 2 | 8 | 24% |
| | E.Coli | 0 | 1 | 2% | | 1 | 3 | 10% |
| | Klebsiella spp. | 0 | 3 | 5% | | 1 | 2 | 7% |
| | Other Enterobacteriaceae | 4 | 5 | 16% | | 3 | 1 | 10% |
| | Haemophilus spp. | 1 | 0 | 2% | | 2 | 0 | 5% |
| | Other pathogens | 8 | 7 | 27% | | 2 | 8 | 24% |
| **MDR** | MDR Ps.Aeruginosa | 4 | 5 | 16% | | 0 | 2 | 5% |
| | ESBL | 3 | 5 | 14% | | 0 | 6 | 15% |
| | MRSA | 0 | 1 | 2% | | 0 | 0 | 0% |

*[Microbiology]*

**Conclusions:** Continuous knowledge of local microbiology in our SICU associated to the implementation of evidence-based measures allow to reduce the incidence of MDR pathogens in POP. According to our results, an adjustment of the empirical antibiotic therapy is needed.

## 11AP12-5

### The effect of hyperbaric oxygen treatment on aspiration pneumonia

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**Background and Goal of Study:** We have studied whether hyperbaric oxygen (HBO) prevents different pulmonary aspiration materialsinduced lung injury in rats.
**Materials and methods:** The experiments were designed in 60 Sprague-Dawley rats, ranging in weight from 250 to 300 g, randomly allotted into one of six groups (n = 10):saline control, Biosorb Energy Plus (BIO), hydrochloric acid (HCl), saline+ HBO treated, BIO + HBO treated, and HCl + HBO treated. Saline, BIO, HCl were injected into the lungs in a volume of 2 ml/kg. A total of seven HBO sessions were performed at 2,4 atm 100% oxygen for 90 min at 6-h intervals. Seven days later, rats were sacrificed, and both lungs in all groups were examined biochemically and histopathologically.
**Results and and discussion:** Our findings show that HBO inhibits the inflammatory response reducing significantly ($P<0.05$) peribronchial inflammatory cell infiltration, alveolar septal infiltration, alveolar edema, alveolar exudate, alveolar histiocytes, interstitial fibrosis, granuloma, and necrosis formation in different pulmonary aspiration models.
Pulmonar aspiration significantly increased the tissue HP content, malondialdehyde (MDA) levels and decreased ($P<0.05$) the antioxidant enzyme (SOD, GSHPx) activities. HBO treatment significantly ($P<0.05$) decreased the elevated tissue HP content, and MDA levels and prevented inhibition of SOD, and GSH-Px ($P<0.05$) enzymes in the tissues.
Furthermore, there is a significant reduction in the activity of inducible nitric oxide synthase, TUNEL and arise in the expression of surfactant protein D in lung tissue of different pulmonary aspiration models with HBO therapy.
**Conclusions:** It was concluded that HBO treatment might be beneficial in lung injury, therefore, shows potential for clinical use.
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## 11AP12-6

### The hydroxylase inhibitor dimethyloxyallyl glycine protects lung epithelial barriers from LPS-induced injury in mice

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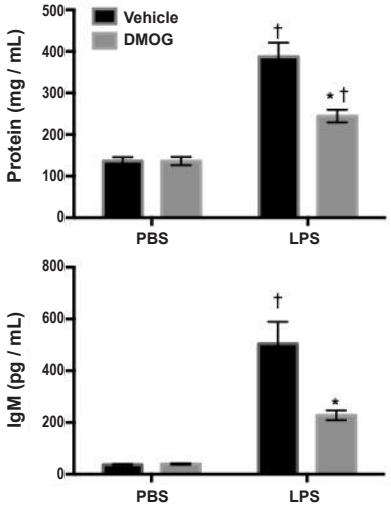
**Background and Goal of Study:** Disruption of lung epithelial barriers is a hallmark of acute respiratory distress syndrome (ARDS). We have previously reported that activation of hypoxia-inducible factor-1 (HIF-1) in the lung epithelial cells has an anti-inflammatory effect.[1]
Based on the observation, we hypothesized that HIF-1 protects lung epithelial barriers in ARDS. We evaluated the effects of HIF-1α stabilization by intratracheal administration of the hydroxylase inhibitor dimethyloxyallyl glycine (DMOG) on the LPS-induced lung injury.
**Materials and methods:** DMOG (2mg dissolved in 50$\mu$l of PBS) or vehicle was intratracheally administered to C57BL/6J mice (n=8 per group). HIF-1α stabilization by DMOG was confirmed by measuring HIF-1α protein concentration in the lung. One hour after DMOG treatment, lung injury was induced by intratracheal LPS instillation. Another 15 hours after LPS challenge, mice were euthanized and broncoalveolar lavage fluid (BALF) and lung tissues were collected. To investigate the permeability of alveolar barriers, we measured the concentrations of protein and IgM in the BALF. Additionally, we quantified RAGE, which is a marker of lung epithelial injury, in the BALF. To elucidate the effect of DMOG on neutorphilic inflammation, we also evaluated myeloperoxidase (MPO) concentration in the BALF and the lung tissues.
**Results and discussion:** Intratracheal administration of DMOG successfully increased HIF-1α protein concentration in the lung. DMOG significantly attenuates LPS-induced increases of protein and IgM in the BALF (Fig.1). Moreover, the increase of RAGE is attenuated by DMOG. However, MPO in the BALF and the lung tissues were not significantly affected by DMOG, suggesting that protection of lung epithelial barriers is not due to suppression of neutrophilic inflammation.




*$p$<0.05 vs. Vehicle group, †$p$<0.05 vs. PBS group

*[Fig.1]*

**Conclusion:** Intratrahceal administration of DMOG protects lung epithelial barriers from LPS-induced injury. HIF-1α stabilization by DMOG may be a potential therapeutic approach for ARDS.

**References:**

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## 11AP12-7

### Sivelestat sodium and mortality in severe pneumonia patients requiring mechanical ventilation: an observational nationwide study

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**Background and aims:** Sivelestat is widely used in treatment of acute respiratory distress syndrome (ARDS) in Japan. Although the efficacy of sivelestat has been reported in numerous Japanese studies, a multinational retrospective cohort study did not support these findings. Furthermore, some studies have reported that early sivelestat use reduced mortality in ARDS patients. The aim of this study was to examine the association between early use of sivelestat and reduced mortality in severe pneumonia patients requiring mechanical ventilation.

**Materials and methods:** We conducted a retrospective observational study using the Diagnosis Procedure Combination database, a national inpatient database in Japan. We identified pneumonia patients requiring mechanical ventilation who were older than 45 years and hospitalized between April 2012 and March 2014. Propensity scores were estimated by a logistic regression analysis, in which the use of sivelestat within two days of admission was the dependent variable, and independent variables included patient backgrounds, comorbidities, and other drugs. We performed one-to-one propensity score matching to make a matched cohort of patients with or without sivelestat use. The outcomes were 7- and 30-day mortality.

**Results and discussion:** Pneumonia patients requiring mechanical ventilation ($n$ = 15,564) were categorized into sivelestat ($n$ = 1,832) and control ($n$ = 13,732) groups. There were significant differences between the sivelestat and control groups in both 7-day mortality (11.2% vs. 8.9%: p<0.001) and 30-day mortality (32.0% vs. 23.0%: p<0.001). In the 1,634 pairs of propensity-matched patients, there were no significant differences in 7-day mortality (sivelestat vs. control: 10.8% vs. 11.9%: p=0.349) and 30-day mortality (sivelestat vs. control; 31.7% vs. 29.0%: p=0.102).

**Conclusion:** The present nationwide study showed that sivelestat was more likely to be used for severe pneumonia patients. The propensity-matched analyses revealed that the use of sivelestat for severe pneumonia patients was not associated with decreased mortality.

## 11AP12-8

### The role of sUPAR and SAPS II on the ventilator-associated pneumonia

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**Background:** Ventilator associated pneumonia (VAP) is one of the serious clinical condition in mechanically ventilated patients. The aim of this study to investigate the effect of Simplified Acute Physology Score (SAPS) II, soluble urokinase plasminogen activator receptor (sUPAR), C-reactive protein (CRP), procalcitonin (PCT) and lactate values on mortality for VAP.

**Materials and methods:** After obtaining the ethics committee aproval, over 18 years old fifty-four patients with VAP in intensive care unit (ICU) were included in this study. SAPS II values were calculated and recorded. Blood samples were collected in order to detect sUPAR, CRP, PCT and lactate values at the first and fifth days. Patients were followed-up during 28 days and recorded as recovered, under follow-up or exitus.

**Results:** The average age of the patients was 57.1±15.6 years, length of stay ICU was 21.2±20.4 days. At the end of 28 day, 59.3% of patients were exitus, 9.3% of patients were discharged and 31.5% of patients were continued the follow-up.

At the fifth day, sUPAR values were higher and PCT values were lower than the first day (p=0.028, p=0.007, respectively )(Table 1). There were no significantly differences in lactate and CRP values (p>0.05)(Table 1). There were no correlations between sUPAR values at first and fifth days and SAPS II values (p=0.211, r=0.170, p=0.178, r=0.190, respectively). There were no correlations between sUPAR values at first and fifth days and SAPS II predictive mortality percentage(p=0.200, r=0.180, p=0.169, r=0.190, respectively).

In alive patients, CRP and PCT values at the fifth day, SAPS II values and SAPS II predictive mortality percentage were lower than dead patients (p=0.017, p=0.035, p=0.0001, p=0.0001, respectively)(Table 2). In logistic regression model, length of stay ICU, SAPS II predictive mortality percentage, sUPAR, lactate and CRP values at the first day were found as independent risk factors affecting mortality (p=0.001, p=0.003, p=0.045, p=0.028, p=0.020, respectively). A statistically significant cut-off value could not be obtained for sUPAR. When used a value of 45 for SAPS II, 71.9% sensitivity and 68.2% specificity were obtained.

**Conclusion(s):** For VAP, sUPAR has no prognostic value but it may be an independent risk factor for mortality. SAPS II is a prognostic factor for these patients and high SAPS II values may be associated with an increased risk of mortality.

## 11AP12-9

### Current daily practice in Danish Intensive Care units regarding weaning from mechanical ventilation

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**Background and Goal of Study:** Mechanical ventilation is a lifesaving intervention, but also holds a risk of complications such as ventilator-associated pneumonia or lung injury. The goal should always be to minimize time spend on mechanical ventilation facilitated by weaning starting as soon as possible. Time spend in weaning is 40 % of the total time spend in mechanical ventilation. Evidence suggest, that protocolized weaning may shorten the time spend on mechanical ventilation. Therefore recommendations from the Danish society for anesthesiology and intensive care (DASAIM, 2014) are to establish protocols for weaning from mechanical ventilation.

We wanted to investigate the number of intensive care units (ICU) in Denmark currently using protocols for weaning from mechanical ventilation.

**Materials and methods:** From June to August 2014, we made phone calls to the attending physicians at the 31 general ICU's in Denmark, inquiring the individual wards daily practices regarding weaning from mechanical ventilation.

**Results and discussion:** Of the 31 ICU's 13 had protocols for weaning from mechanical ventilation. 5 of those protocols represented ventilator controlled weaning. Two units performed daily Spontaneus Breathing Trials (SBTs). The rest had various protocols for weaning from ventilatory support. 7 physicians reported success rates with weaning protocols for more than 75% of their patients. Of these 7 wards 3 were using ventilator controlled weaning. The rest of the ICU's managed weaning based on ordinations on daily rounds.

**Conclusion(s):** At present recommendations from The Danish Society for Anesthesiology and intensive care medicine has only been implemented in 40% of the general ICU's in Denmark. By making phone calls to the attending physicians instead of a more formal inquiry we hope our data represents the actual daily practices instead of statements of intent.

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DASAIM National behandlings- vejledning for voksne patienter med ALI og ARDS 2013 link http://www.dasaim.dk/images/stories/ALI_ARDS.pdf

**Acknowledgements:** Coauthors MD Frank Ø. Hansen and Md & phd Thomas Strøm.

## 11AP12-10

### Respiratory monitoring with electrical impedance tomography during alveolar recruitment maneuver in a patient with impairment of respiratory function

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**Background:** Mechanical ventilation: monitoring tidal volume distribution bedside.

**Case report:** 5 7 years old pacient, with acute myocardial infarction that produces heart failure with an ejection fraction of the left ventricle of 20%, and hemodynamic instability where the implantation of a biventricular assistance was necessary. While entering suffered a impairment of respiratory function. Respirator ventilatory parameters were adjusted to prevent lung damage, low tidal volume (480 ml), respiratory rate of 13 and a level of positive end expiratory pressure of 8 cmH2O. By monitoring pulmonary tidal volume distribution with Electrical Impedance Tomography, bedside, we note that the distribution of tidal volume was not homogeneous. Alveolar recruitment maneuver under control of the SIT allowed to observe the distribution of tidal volume and which were necessary to ventilate the lungs homogeneously.

**Discussion:** Mechanical ventilation can cause damage or increase the lung damage may already exist and that concept has been called lung injury induced by mechanical ventilation (VILI) (1). The VILI relates to the application of a PEEP level insufficient to prevent alveolar collapse and reopening cyclic (atelectrauma) causing increased alveolar inflammatory infiltrate, the use high alveolar pressures (barotrauma) and causing perivascular and alveolar edema; and high respiratory rates, repetitive cycling.

Preventing alveolar overdistension can be achieved using Tv≤ 6ml / kg ideal weight and Pplat <30 cmH2O. EIT is a technique that does not identify any such damages by inadequate mechanical ventilation. But it lets see directly the effectiveness of the ARM, and therefore helps to establish what necessary for effective ARM and helps set the proper PEEP level(2), allowing a more homogeneous distribution of tidal volume pressures.

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**Learning points:** EIT bedside could be an alternative to CT scans in evaluating the ventilation of lung regions(2).

## 11AP12-11

### Assessment of tidal recruitment during inhalation by electrical impedance tomography and dynamic computed tomography - feasibility study in porcine model lavage injury

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**Background and Goal of Study:** Tidal recruitment of atelectasis is a known contributor to ventilator induced lung injury, but its detection remains a challenge. The most promising technology therefor seems to be electrical impedance tomography (EIT). Our aim was to find a correlate for tidal recruitment by EIT during ongoing respiration compared to dynamic computed tomography (dCT).

**Materials and methods:** With animal committee approval, 4 mechanically ventilated pigs were studied in healthy and after lung lavage during a pressure ramp maneuver: 0 to 50 mbar (5 mbar/sec). EIT (Pioneer-Set, Swisstom, Switzerland) and dCT (Emotion 16, Siemens AG, Germany) were recorded time-synchronized. To identify tidal recruitment, we extended the previously described static center of ventilation (CoV) method [1] by computing it dynamically over inhalation (dCoV in EIT). For direct comparison, the center of gravity (dCoG) was post-processed by dCT.

**Results and discussion:** Preliminary results showed that both EIT and dCT could follow the shift in ventilation distribution during inhalation ($p<.05$). In presence of tidal recruitment, a movement of the dCoV in EIT towards the dependent lung occurred in analogy with the movement of dCoG by dCT ($R^2=.84$, Fig.1A). In dCT, this shift of the dCoG was attributed to a decrease of atelectatic lung volume. In the healthy lung, where dCT indicated no tidal recruitment, the dCoV-EIT showed only minor changes during inhalation (Fig.1B). Although we performed the experiment during a time-expanded pressure ramp to capture enough data points with the dCT, the presented dCoV method per se should be appropriate for monitoring tidal recruitment by EIT during ongoing respiration without the need of any specific maneuvers.

**Conclusion:** Our data provides first evidence that tidal recruitment can be estimated by the EIT dCoV method.

**Reference:**

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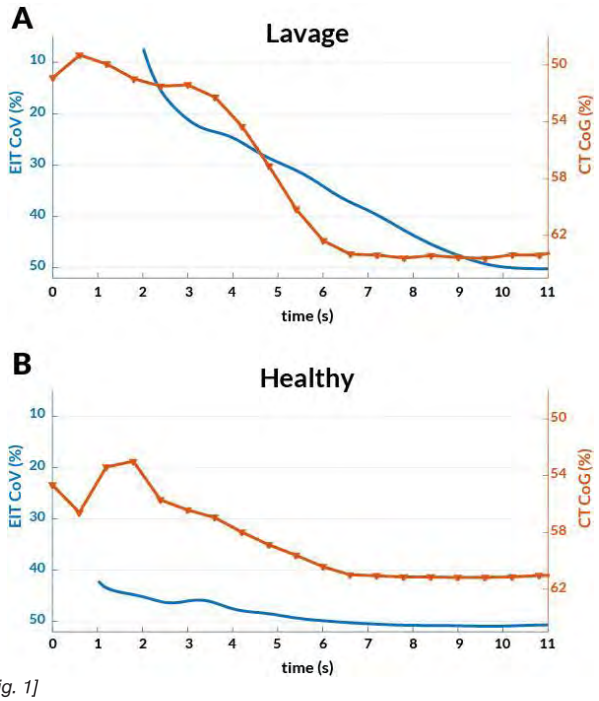


*[Fig. 1]*

## 11AP12-12

### Efficiency of high-flow nasal cannula in pediatric patients following cardiac surgery

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**Background and Goal of Study:** In respiratory management of pediatric patients following cardiac surgery, there are few reports on the efficiency of high-flow nasal cannula (HFNC). The aim of our retrospective study was to compare high-flow nasal cannula with conventional oxygen therapy in pediatric patients following cardiac surgery.
**Materials and methods:** Our objects were pediatric patients less than 1 year old who were consecutively undergone respiratory management with mechanical ventilator and extubated in the ICU after cardiac surgery from February 2014 to November 2015. Patients were divided into two groups (HFNC group and Control group) from the time of extubation. When HFNC device was applied, the mixtured gas was set at 2 l/kg/min. The decision of FIO2 was entrusted to intensive care physician. The data of blood gas analysis and respiratory rates at rest were retrospectively collected during spontaneous breathing test before extubation, just after extubation, and next morning. Since the normal respiratory rate is variable in childhood, we compensated the data of actual respiratory rate to the ratio of actual and normal respiratory rate. Normal respiratory rate were obtained from Nelson textbook of pediatrics. We carried out the T-test and Mann-Whitney test. $P < 0.05$ was considered significant difference.
**Results and discussion:** Thirteen patients in the HFNC group, 16 patients in the control group were enrolled in this study. Age of patients was 4.8 ± 7.2months in HFNC group vs 8.6 ± 6.6 months in control group ($p = 0.157$) and body weight was 4.5 ± 2.0 kg vs 7.1 ± 2.1 kg ($p = 0.003$).
PaO2 was 387.6 ± 94.9mmHg vs 353.7 ± 79.3mmHg ($p = 0.228$) in spontaneous breathing test, 413.1 ± 142.9mmHg vs 290 ± 108.6mmHg ($p = 0.028$) after extubation, and 413.2 ± 100.8mmHg vs 321.4 ± 101.0mmHg ($p = 0.018$) on next morning.
The data of PaCO2 were similar between 2 groups in each period. Respiratory rate ratio (actual / normal) were 1.05 ± 0.22 vs 1.26 ± 0.32 ($p = 0.030$) after extubation, and 0.98 ± 0.20 vs 1.19 ± 0.33 ($p = 0.075$) on next morning. No patients required re-intubation in both group.
This study showed that HFNC improved both oxygenation and ventilation of pediatric patients extubated following cardiac surgery. However our study had several limitations, further large-scale prospective study is required.
**Conclusion:** HFNC was efficient in pediatric patients following cardiac surgery.

# Critical Emergency Medicine - Trauma and Resuscitation

## 12AP01-1

### Determining the highest external pressure that permits rapid transfusion without hemolysis as observed using a scanning electron microscope and alteration in deformability

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**Background and Goal of Study:** Externally applied pneumatic pressure can be helpful for rapid transfusion of red blood cells (RBCs). However, a potential disadvantage of external pressure is hemolysis and decreased deformability caused by increased shear stress. We hypothesized that the degree of hemolysis with an increase in external pressure can be observed using a scanning electron microscope (SEM). Moreover, no study has assessed alteration in deformability under various pressures. The primary endpoint was to determine differences in shape and deformability in RBCs under various pressures. The secondary endpoint was to determine the highest pressure without hemolysis and alteration in deformability.
**Materials and methods:** Twenty blood bags were used for investigation. Each blood bag was divided into five subgroups and five types of pressure were applied: 0, 150, 200, 250, and 300 mmHg. After applied pressure, the blood bag was connected to an infusion set and was run through a 20-gauge catheter and was collected in a beaker. After infusion, six samples from the beaker, for which 0 and 300 mmHg pressures was applied, were selected and were observed using SEM. The percentages of irreversibly changed cells were evaluated using Bessis' classification. All blood samples were taken from the beaker to test deformities, serum potassium level, hematocrit, and RBC count. Statistical significance was defined as $P<0.05$. The data were analysed by ANOVA, paired t-test, and t-test.
**Results and discussion:** There were no significant differences in the percentage of irreversibly changed RBCs between the pressures 0 and 300 mmHg. Moreover, there were no significant differences in laboratory test results and deformability among all types of pressures. No differences in laboratory test results were noted among all pressures compared to those in previous studies that reported an increase in external pressure from 0 to 300 mmHg caused an increase in potassium levels. However, we observed RBC directly as well as laboratory test results. Our findings showed similar results on both SEM analysis and laboratory tests.
**Conclusions:** Hemolysis and deformability of RBCs are not influenced by external pressure from 0 to 300 mmHg. Therefore, RBC transfusion with an external pneumatic pressure 300 mmHg through 20-guage catheter can permit rapid transfusion without hemolysis and alteration in deformability in an emergency situation.

## 12AP01-2

### Angiopoietin-1 mimetic restores microcirculatory perfusion disturbances and microvascular leakage during haemorrhagic shock

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**Background and Goal of Study:** Microcirculatory dysfunction, a hallmark of critical illness, is associated with multiple organ failure and unfavourable patient outcome. Although crystalloids are effective in restoring macrohaemodynamics during haemorrhagic shock, microcirculatory dysfunction often persists. Therapeutic targeting of the angiopoietin/Tie2 system might preserve microvascular integrity. Therefore, we investigated the effects of an angiopoietin-1 mimetic on microcirculatory perfusion and microvascular leakage during haemorrhagic shock.
**Materials and methods:** Male rats underwent haemorrhagic shock (HS) or sham surgery receiving an angiopoietin-1 mimetic (Ang1mim) or PBS. HS was induced by blood withdrawal to achieve a mean arterial pressure (MAP) of 30mmHg for one hour, followed by resuscitation with crystalloids and blood until baseline MAP was reached. Microcirculatory perfusion was measured in the cremaster muscle using intravital microscopy and microvascular leakage was assessed by Evans Blue Dye (EBD) extravasation.
**Results and discussion:** HS was characterised by a significant drop in MAP, heart rate and base deficit. This was accompanied by significantly reduced perfused capillaries and increased stopped vessels during shock, which could not be restored by fluid resuscitation. HS increased plasma angiopoietin-1 and sTie2 levels and decreased angiopoietin-2 levels, without altering VCAM1 and interleukin-6 levels. In parallel, HS induced microvascular leakage in kidney and lung tissue.
Administration of Ang1mim had no effect on haemodynamic alterations and microcirculatory perfusion during shock. However, Ang1mim in combination with fluid resuscitation restored microcirculatory perfusion back to baseline. Interestingly, significant less blood was required to restore MAP to baseline. Furthermore, Ang1mim attenuated microvascular leakage in kidney and lung tissue.
**Conclusion(s):** Administration of an angiopoietin-1 mimetic restores microcirculatory perfusion during haemorrhagic shock and reduced requirement of fluid resuscitation, possibly due to less microvascular leakage. These results suggest that the angiopoietin/Tie2 system might be a novel target to improve microcirculatory perfusion, microvascular leakage and organ dysfunction during haemorrhagic shock.

## 12AP01-3

### Storage time does not affect outcome after massive blood transfusion in trauma and non-trauma patients

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**Background and Goal of Study:** Red blood cell transfusion and massive blood transfusion are independent risk factors for mortality. Prolonged stored packed red blood cells (PRBC) might increase morbidity and mortality. Therefore, we tested whether prolonged storage increases mortality in patients receiving massive transfusion after trauma needing surgery and surgery related to non-trauma issues. As a secondary hypothesis, we considered the extent to which a differential relationship for trauma and non-trauma patients and mean PRBC storage duration exists.
**Materials and methods:** With IRB approval, we performed a single center retrospective analysis of patients receiving more than 10 units of PRBC within 24 hours. We evaluated the relationship between patient mean PRBC storage duration and in-hospital mortality using backward stepwise multivariable logistic regression. Potential nonlinearities in the relationship were assessed via restricted cubic splines. The secondary hypothesis was evaluated by considering the interaction between type of surgery (trauma vs. non-trauma) and patient mean PRBC storage duration.
**Results and discussion:** The final analysis was done in 305 patients receiving a total of 8046 PRBCs. Patient mean PRBC storage duration ranged from 8 to 36.6 days with a mean ± standard deviation of 22.1 ± 5.9 days. The odds ratio (95% confidence interval (CI)) for in-hospital mortality corresponding to a one-day in mean PRBC storage duration was estimated at 0.99 (0.95, 1.03, P=0.77). We did not find a differential relationship between trauma and non-trauma patients (P=0.75). Data from 259 patients was included into a multivariable analysis but the result did not differ from the univariable analysis and the odds ratio (95% CI) was 0.99 (0.94, 1.05) after adjusting for age, sex, blood type, initial heart rate, initial systolic blood pressure, initial pH, and number of transfused PRBCs were selected for adjustment in the final models.
**Conclusion(s):** In summary, our data suggest that mean PRBC storage duration does not correlate with patients mortality after massive blood transfusion. Trauma and non-trauma patients did not differ in regard to susceptibility toward prolonged stored PRBCs.

## 12AP01-4

### Organ function during porcine haemorrhage and resuscitation with pre-existing atherosclerosis

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**Background and Goal of Study:** Haemorrhagic shock causes tissue hypoxia, hyper-inflammation and subsequent multi-organ failure (MOF). Pre-existing cardiac comorbidity increases mortality after trauma[1]. However, obesity, a risk factor for ischemic heart disease, is associated with reduced ICU mortality[2]. Therefore, we investigated the impact of atherogenic diet-induced coronary artery disease (CAD)[3] on MOF during haemorrhage and resuscitation.
**Materials and methods:** Up to now, 13 anesthetized and instrumented familial LDL-cholesterol-receptor$^{-/-}$ (FBM) pigs with (CAD, n=7) or without (control, n=6) atherogenic diet underwent 3 hours of haemorrhage (removal of 30 % of the calculated blood volume, mean arterial pressure (MAP) = 44 (42-46) mmHg) followed by 48 h of resuscitation comprising re-transfusion of shed blood, crystalloids and noradrenaline (NoA) titrated to maintain MAP at pre-shock levels. Before, at the end of and every 12 hours after haemorrhage we assessed systemic, pulmonary and renal haemodynamics (left ventricular (LV) pressure-conductance and pulmonary artery catheterization; renal artery ultrasound flow probes), gas exchange and organ function. Data are median (range).
**Results and discussion:** Survival time (CAD: 37 (23-48) h; control: 37 (24-48) h, p=0.88) and NoA requirements needed to reach target haemodynamics (CAD: 1.2 (0.8-4.5) $\mu g \cdot kg^{-1} \cdot min^{-1}$; control: 1.5 (0.9-1.9) $\mu g \cdot kg^{-1} \cdot min^{-1}$, p=0.99) were comparable. Creatinine clearance was 66 (9-87) ml/min vs. 67 (33-92) ml/min (p=0.62) and 90 (32-99) ml/min vs 55 (24-85) ml/min (p=0.29) in CAD and control groups during 0-24 h and 24-48 h of resuscitation, respectively. Systemic and pulmonary haemodynamics, gas exchange and LV function (dp/dt min and max, isovolumic relaxation constant tau) did not show any significant inter-group difference either.
**Conclusion:** In our model of resuscitated haemorrhagic shock, pre-existing atherosclerosis neither increased mortality nor aggravated the severity of MOF. Aggressive fluid resuscitation and high-dose NoA may have overcome any impact related to pre-existing chronic cardiovascular disease. In addition, putative protective effects due to the “obesity paradox” may have blunted otherwise detrimental influence of pre-existing atherosclerosis.
Supported by the DFG (CRC 1149).
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## 12AP01-5

### Effects of the $H_2S$-donor AP39 during murine haemorrhage and resuscitation

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**Background:** The mitochondria-targeted $H_2S$-donor AP39 has previously been shown to exert cytoprotective effects in vitro by stimulation of mitochondrial respiration [1]. In vivo, AP39 improved haemodynamic and neurological outcome following cardiac arrest after pre- or early post-treatment administration [2,3]. Therefore, we tested the hypothesis whether AP39 has a beneficial impact in a resuscitated murine model of haemorrhagic shock.
**Methods and measurements:** Anaesthetised and instrumented mice (*C57BL/6J)* underwent 1h of haemorrhage (mean arterial pressure MAP=35mmHg) and subsequently 4h of resuscitation comprising a bolus injection of 100nmol/kg AP39 (n=7) or vehicle (n=10), re-transfusion of shed blood together with lung-protective mechanical ventilation, fluid resuscitation and noradrenaline (NA) titrated to maintain MAP>50mmHg. Lung mechanics, gas exchange, haemodynamics, metabolism, and acid-base status were measured together with lung and kidney histology, immune-histochemistry, western blotting and high resolution respirometry to assess tissue mitochondrial activity (maximal oxidative phosphorylation: OxPHOS; maximal $O_2$ consumption in the uncoupled state: ETS). Data are median (quartiles).
**Results:** AP39 was associated with higher NA requirements (54 (10;176), control 0 (0;0) $\mu$g/g/h), which coincided with hyperglycaemia and more pronounced metabolic acidosis. AP39 had no significant effect on OxPHOS, or ETS in diaphragm, heart, kidney and liver.
**Conclusion:** In contrast to the promising in vitro and in vivo data in cardiac arrest, AP39 had no beneficial effect after murine haemorrhagic shock, possibly due to its timing and dose. In addition, the higher NA requirements, which may have resulted from AP39-related vasodilation [3], might have further offset beneficial effects on mitochondrial respiration.
**References:**
1. Szcesny B, Nitric Oxide 2014, 41:120;
2. Ikeda K, Nitric Oxide 2015, 49-90;
3. Tomasova L, Nitric Oxide 2015, 46:131. Supported by the DFG (CRC1149, project B02).

## 12AP01-6

### Comparative evaluation of fast or slow crystalloid resuscitation on oxygen delivery in a human model of haemorrhagic shock

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**Background and Goal of Study:** The most effective rate of fluid resuscitation in haemorrhagic shock is unknown. We performed a randomized crossover pilot study in a healthy volunteer model of compensated haemorrhagic shock. Following venesection of 15ml.kg$^{-1}$ of blood, participants were randomized to 20mL.kg$^{-1}$ of crystalloid over 10 minutes (FAST treatment) or 30 minutes (SLOW treatment).
The primary end point was oxygen delivery ($DO_2$). Secondary end points included pressure and flow-based haemodynamic variables, blood volume expansion, and clinical biochemistry.
**Materials and methods:** We performed a randomized crossover pilot study in a healthy volunteer model of compensated haemorrhagic shock. Following venesection of 15ml.kg$^{-1}$ of blood, participants were randomized to 20mL.kg$^{-1}$ of crystalloid over 10 minutes (FAST treatment) or 30 minutes (SLOW treatment). The primary end point was oxygen delivery ($DO_2$). Secondary end points included pressure and flow-based haemodynamic variables, blood volume expansion, and clinical biochemistry.
**Results and discussion:** Nine normotensive healthy adult volunteers participated. No significant differences were observed in $DO_2$ and biochemical variables under the SLOW and FAST treatments. Estimated blood volume at baseline was 5.1L. Blood volume was reduced by 16% following venesection, with a corresponding 5% reduction in cardiac index (CI) ($p<0.001$). Immediately following resuscitation under the FAST and SLOW treatments, mean (SD) blood volume increased by 720mL (210mL) and 920mL (223mL), respectively ($P<0.03$), corresponding to 54% (7%) and 69% (16%) of the infused volume. This blood volume expansion attenuated with time, to 24% and 25% of the infused volume 30 minutes post-infusion. During fluid resuscitation, blood pressure was higher under FAST treatment, however CI paradoxically decreased in most participants, a finding not observed under SLOW treatment.
**Conclusions:** No significant differences in $DO_2$ were observed between FAST or SLOW fluid resuscitation treatments. Under both treatments, changes in CI and blood pressure did not reflect the magnitude of intravascular blood volume deficit. Crystalloid resuscitation expanded intravascular blood volume by approximately 25%. Myocardial performance was impaired during FAST fluid resuscitation.

## 12AP01-7

### Improvement of survival and organ protection after haemorrhagic shock by treatment with inhaled nitric oxide

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**Background and Goal of Study:** Organ dysfunction following haemorrhagic shock and the survival rate have not improved sufficiently over time.Nitric Oxide(NO) is considered to be closely involved in the development of haemorrhagic shock-induced organ dysfunction. Control of NO production by intravenous administration of NO donors and NOS inhibitors has been attempted, but these are not suitable for clinical application.It has not been reported for use in the treatment of haemorrhagic shock.Thus, we investigated whether inhaled NO administration leads to differences in survival, central venous NO2 levels, and organ dysfunction in a rat haemorrhagic shock model.
**Materials and methods:** Fourty male SD rats were used. Tracheotomy was applied under general anesthesia, microdialysis probes were placed in the arterial line and central vein, and NO2 was measured in the dialysis probes using an oxidized nitrogen analysis system (ENO-20, Eicom). The systolic arterial pressure was maintained at 40 mmHg by withdrawing and returning blood for one hour (haemorrhagic shock). The animals were resuscitated with saline in a volume equivalent to the residual blood. After resuscitation, rats were exposed to NO by inhalation for 30 minutes.The rats were randomly divided into the following 4 groups:
(1) Sham (haemorrhagic shock-, inhaled NO-)
(2) haemorrhagic shock+NO+(20ppm)
(3) haemorrhagic shock+NO-
(4) haemorrhagic shock+NO+(150ppm)
Hemodynamic changes and NO2 levels were measured over time, and the survival rate was calculated.
**Results:** The survival rate was higher in the group with haemorrhagic shock followed by inhaled 20ppm NO compared with the group without inhaled NO ($p=0.033$)and the group with haemorrhagic shock followed by inhaled 150ppm NO.NO2 levels were significantly lower in the Shock+NO- group (vs. Shock+20ppm NO+ group 3Hr, vs. Shock-NO- group 7Hr), and significantly higher in the Shock+20ppm NO+ group (vs. the Shock+NO- and Shock-NO- groups 3Hr) .$NO_2$ production was decreased during the early phase of haemorrhagic shock (-7hr), suggesting that the shock decreased survival, and that inhaled NO protected the organs and improved survival.
**Conclusion(s):** The survival rate increased in haemorrhagic shock rats that were treated with inhaled NO compared with rats that were not.
It was suggested that administration of inhaled NO is effective for the early phase of haemorrhagic shock.

## 12AP01-8

### Early hemodynamic changes are associated with mortality from atrio ventricular node arrhythmias following hemorrhage in a swine model

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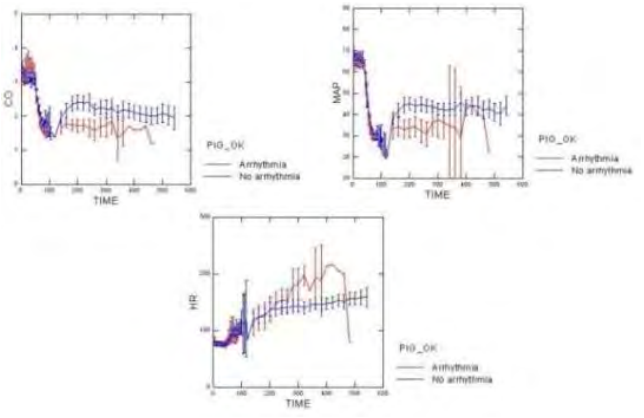
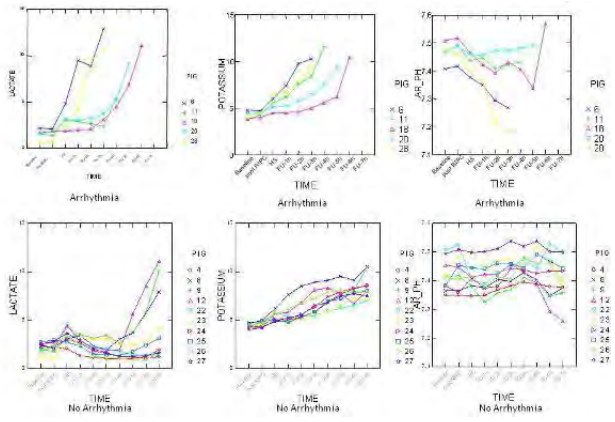
**Background:** Hemorrhage is a leading cause of death in trauma. Our study on remote ischemic pre-conditioning in pigs undergoing hemorrhage showed a pattern of pre terminal atrioventricualr node arrhythmias in all pigs that died during the experiment. Surviving pigs had no cases of arrhythmia. Hemodynamic parameters between groups were analyzed further.
**Methods:** Following ethical approval, hemorrhagic shock was induced by taking 50cc aliquots from an arterial line until 35% of blood volume was removed. Animals were observed for 7 hours or until death for MAP, cardiac output (CO), mixed venous oxygen saturation (SVO2) & heart rate (HR). Samples were taken hourly for full blood count, biochemistry, arterial and venous blood gasses. There were no other interventions. The rate of change from the end of bleeding until the 1st and 2nd hour (DFU2) of observation between the survivors and non-survivors was calculated. Statistical analysis was performed using Wilcoxon-Mann Whitney U.
**Results:** All pigs had similar changes in parameters until the end of bleeding. 6 pigs with arrhythmia died, 10 had no arrhythmia and survived. Pigs that died did not compensate their CO ($p=0.008$), oxygen delivery (DO2) ($p=0.028$) or MAP ($p=0.008$). $SvO_2$ remained low ($p=0.028$) at DFU2 (fig 1).




*[Figure 1. Cardiac Output (CO), Heart Rate (HR) and Mean Arterial Pressure (MAP) vs. Time]*

Changes in HR, oxygen consumption and oxygen extraction ratio were not statistically different. There was a corresponding increase in lactate ($p=0.008$) and decrease in pH ($p=0.018$) by DFU2 (fig 2).




*[Figure 2. Lactate, Potassium and pH over time]*

**Conclusions:** Despite similar initial changes, we found low CO, $DO_2$, $SvO_2$ and MAP at DFU2 are linked to mortality. To the best of our knowledge this is the first time in a large animal model that maladaptive responses across a range of cardiovascular parameters have been reported to begin immediately after hemorrhage in a large animal model.

## 12AP01-9

### Prognostic significance of depth of burn injury on the burn patients survival

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**Background and Goal of Study:** In recent years, great progress in the treatment of burns was achieved thanks to advances in resuscitation and fluid replacement, surgical approach, nutritional and pulmonary support. However, mortality remains high. The goal of our study was to determine mortality rate as well as to find out the most significant risk factors of mortality.
**Materials and methods:** We did a single center prospective study. Patients older than 14 years, with burn injury of I, II and III degree and different mechanism of injury, treated from October 2011 until October 2015, were included in the study. The influence of following variable on mortality rate were investigated: age, sex, total body surface area (TBSA), depth of injury, time from injury to arrival to the hospital, mechanism of injury, the presence of comorbidity, the occurrence of complications, inhalation injury, mechanical ventilation and surgical treatment. We used t-test to compare the average values of the parametric features, while Pearson's chi-square test was used to compare the differences in frequency of categorical feature. Cox regression analysis was used in order to determine risk factors of intrahospital survival. P values <0.05 were considered statistically significant.
**Results and discussion:** The study included 644 patients, 73.1% male and 26.7% female, average age 54 ± 30 years. The average TBSA was 15.91% ± 17.99% (min 1%, max 98%), mostly deep burn injury of IIb/III and III degree in 60.7% patients. The incidence of inhalation injury was 5.1%, mechanical ventilation was applied in 7.9% of patients and 18.2% had some complications (mostly pneumonia). Most of patients 62.7% were treated conservatively while 37.3% were operated. The average duration of hospital stay was 19.38±18.62 days and overall mortality rate was 17.1%. Multivariate cox regression analysis showed that except time from injury to arrival to the hospital, inhalation injury and mechanical ventilation, all variables were independent risk factors of mortality. The strongest risk factors were depth of burn injury RR=6.51, CI (2.24-18.95) and comorbidity RR=3.38, CI (2.06-5.57).
**Conclusion(s):** The results of our study confirms high mortality rate in burn patients and shows that the strongest risk factor of mortality is depth of burn injury.

## 12AP01-10

### Role of apoptosis in the course of traumatic disease in old patients with multiple trauma

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**Background:** At the same time, the course and prognosis of traumatic disease depends on the reactivity of organism that depends on anatomic and physiologic peculiarities of different patients.
**The aim of the study** was to investigate the dependence of systemic oxygen transport on the level of markers of apoptosis and its effect on the course of traumatic disease in old patients with multiple trauma.
**Methods:** 50 patients treated for multiple trauma (APACHE II 13,8±2,2) were prospectively studied. Patients were divided into two groups which received the same complex of intensive care: under the age of 60 years were the first group (n = 28) and over the age of 60 years were the second group (n = 22). We analised parameters of central hemodynamics, morphometry parameters of erythrocytes, level of cytokines (TNF-α, IL-1, IL-6, IL-8), level of caspase 8, endothelin-1, oxygen transport parameters ($DO_2$, $VO_2$ and $ERO_2$). We studied oxygen metabolism in peripheral tissues using polarography method on the 1st, 3rd, 5th, 10th and 21st days.
**Results:** During the examination of patients we did not reveal the differences in the parameters of central hemodynamics and morphometric parameters of erythrocytes between the patients of I and II groups. In patients of the I group the level of TNF-α, IL-1, IL-6 was higher ($p<0,05$) than in patients of group II on the 1st, 3rd, 5th and 10th days of treatment, indicating a better reactivity of the organism. The oxygen transport parameters and the state of oxygen metabolism in tissues were significantly lower ($p<0,05$) in patients in II group during the survey period. Endothelin-1 level also was significantly ($p<0,05$) lower in patients in II group from 3rd to 21st days of treatment. The $DO_2$, $VO_2$, $ERO_2$ and endothelin-1 level had a negative strong correlation with the level of caspase-8 in II group, the level of which they have been significantly ($p<0,05$) higher than in group I during the observation period.
**Conclusion:** Thus, we can conclude that the course of traumatic disease in old patients with multiple trauma depends on the state of endothelium and decreasing precisely of functional activity of erythron system. These changes are caused by increased activity of apoptosis, particularly caspase-8. This fact shows the requirements for endolium protection therapy and antihypoxant drugs in the complex of intensive therapy in old patients with multiple trauma.

## 12AP01-11

### Two casualties, in different geographics points, both of them with haemorrhage, only one surgical team, limited blood supply, in the middle of the night and at sea… what have we learnt about this experience?

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**Background:** Traumatic hemorrhage is a relatively common cause entity that anesthesiologists should have to manage. However, this situation can be complicated when several bleeding patients appear at the same time, if we have limited resources and we are in a isolation situation.
The goal of the study is to describe our experience with two bleeding casualties, concurrent at the same time, in different geographical locations, treated with a single surgical team, with limited availability of blood in a maritime environment.
**Case report:** 6 September 2015, L-51 "Galicia" Spanish Navy warship is sailing in Indian Ocean (Seychelles Islands 100 miles) integrated in European Union Operation "Atalanta". This naval unit has the following medical team: 1 emergency physician (and medical advisor), one abdominal surgeon, one

orthopedic surgeon, one anesthesiologist, one pharmacist specialist in laboratory and clinical analysis, one dentist, six nurses and two paramedics. The blood bank aboard capability is 12 packed red blood units (eight 0+ and four 0-).
We answered an emergency call from a Spanish fishing ship located at 300 miles. One of its sailors has suffered hand trauma with significant blood loss while works with a machine. When we are deciding our civilian fishing ship support, a member of our naval unit suffered hematemesis episode with hipovolemic shock symptoms. The nearest land Hospital (Seychelles) is in the opposite direction to fishing vessel location. Our helicopter on board has 600 miles range. Our first medical decision was treat the patient with hematemesis episode aboard. While, our medical technicians prepared the helicopter (medical evacuation version). After that we sent the medicalized helicopter in order to pick up the sailor with traumatic hand injury. When he comes on board by helicopter surgical team operated him, First patient with hematemesis was stabilized and he was evacuated as soon as possible to land hospital. Finally, the patient with traumatic hand injury was evacuated to the same hospital too. 2 units of packed red blood cells were consumed.
**Discussion:** During bleeding patient care, anesthesiologists must assess not only therapeutic drugs, also health care, logistics and triage aspects. Military medicine experience can be useful in civilian environments too (like disasters, humanitarian crisis…).

## 12AP01-12

### Intra-operative use of Polymyxin-B haemoperfusion in a patient with septic shock and multiple organ failure undergoing emergency abdominal surgery

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**Background:** Polymyxin-B haemoperfusion (PMX-HP) is deemed to improve outcome in septic intensive care patients[1,2]. However, when initiated within 12 hours after abdominal surgery, it failed to reduce organ failure compared to conventional treatment of peritonitis-induced severe sepsis[3].
**Case report:** A 62 year-old patient suffering from severe septic shock with multiple organ failure due to necrotic pancreatitis and colic necrosis (APACHE score 36, SAPS score 84) underwent emergency abdominal surgery. At anaesthesia induction, Pa02/Fi02 ratio was 58 mmHg and noradrenalin requirement was 0, 7$\mu$/kg/min. In addition to conventional management, we initiated a PMX-HP throughout the surgical procedure (147 min). A 12F triple lumen venous catheter (GamCath™, Gambro) was inserted; 2 lumens were used for haemoperfusion. Venous blood passed trough a polymyxin-immobilized cartridge (Toraymyxin® PMX-20-R,) at low speed (<0.4 L/min) using a Hemodec DECAPsmart (Hemodec, Salerno, Italy). Unfractionated heparin was necessary for the haemoperfusion (3000 IU bolus + 20 IU/kg/h for an ACT around 190 sec). Peri-operatively, 20ml/kg/h crystalloids were infused and the noradrenalin dose was halved. Pa02/Fi02 ratio increased to 329 mmHg. Inflammatory parameters rapidly decreased during the procedure (CRP from 454 to 255 U/l, PCT from 48 to 20 $\mu$g/l). Plasma endotoxin levels, measured with the LAL Chromogenic Endotoxin quantification kit (Pierce™ Biotechnology), was 1.27 EU/ml before the haemoperfusion and 0.405 EU/ml after (ratio pre/post = 3.14)The postoperative evolution was favourable with withdrawal of noradrenalin within 72h, renal function improvement at 24h and extubation on day 8. The patient left the ICU on day 15. He was alive and fully recovered at 90-day follow-up.
**Discussion:** To our knowledge, this is the first report of PMX-HP used in the operating room (throughout the entire operative time). The rationale for initiating PMX-HP at the beginning of the surgical procedure is to lower the quantity of blood endotoxin as early as possible, in order to block the initiation of various deleterious biological cascades.
**References:**
1. Vincent JL et al., Shock 2005; 23: 400-5)
2. Cruz et al., JAMA 2009
3. Payen et al., Intensive Care Med 2015; 41:975-84
**Learning points:** PMX-HP initiated at the beginning of surgery was effective in improving hemodynamic and respiratory parameters in this patient with severe septic shock due to colic necrosis.

## 12AP02-1

### Perioperative serum lactate versus Glasgow Coma Scale as a predictor for in-hospital mortality after decompressive craniectomy in traumatic brain injury

Jo Y.Y., Kwak H.J., Lee K.C., Kim H.S., Lee J.Y., Survivor vs. Non-survivor
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**Background and Goal of Study:** Despite the utility of serum lactate for predicting clinical courses, little information is available on the topic after decompressive craniectomy. This study was conducted to access the implications of perioperative serum lactate level and Glasgow Coma Scale (GCS) with respect to in-hospital mortality in traumatic brain injured patients who received emergent or urgent decompressive craniectomy.
**Materials and methods:** The medical records of 586 consecutive patients that underwent emergent or urgent decompressive craniectomy due to traumatic brain injuries from January 2007 to December 2014 were retrospectively analyzed. Receiver-operating characteristic (ROC) curves were used to determine the abilities of factors which had statistic significance in the multivariate regression analysis to predict in-hospital mortality.
**Results and discussion:** The overall mortality rate after decompressive craniectomy was 26.6 %. Mean preoperative serum lactate (3.8 ±2.6 vs. 3.4 ± 2.8, p = 0.039) and intraoperative maximum serum lactate (6.2 ± 3.0 vs. 4.8 ± 2.3 mmol/L, p<0.001) was significantly higher for non-survivors than survivor, but they had no significances for predicting in hospital mortality in the logistic regression analysis. Preoperative Glasgow Coma Score was a significant predictor for in hospital mortality (Hazard ratio 0.715, 95% confidence interval 0.662 - 0.72, p<0.001).
**Conclusion(s):** Although intraoperative maximum latate serum lactate significantly higher for non-survivors than survivor, preoperative GCS, but not perioperative serum lactate level, is a reliable predictor for in-hospital mortality after decompressive craniectomy due to traumatic brain injury. dicting in hospital mortality in the logistic regression analysis. Preoperative Glasgow Coma Score was a significant predictor for in hospital mortality (Hazard ratio 0.715, 95% confidence interval 0.662 - 0.72, p<0.001).
**Reference:**
1. Régnier MA, Raux M, Le Manach Y, Asencio Y, Gaillard J, Devilliers C, et al. Prognostic significance of blood lactate and lactate clearance in trauma patients. Anesthesiology. 2012;117:1276-88 iectomy due to traumatic brain injury. dicting in hospital mortality in the logistic regression analysis. Preoperative Glasgow Coma Score was a significant predictor for in hospital mortality (Hazard ratio 0.715, 95% confidence interval 0.662 - 0.72, p<0.001).

## 12AP02-2

### Using of prothrombin complex concentrate and tranexamic acid in patients with trauma-induced coagulopathy

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**Background:** The mortality in the in patients with traumatic injuries in a case of bleeding is the most frequent cause of preventable death after severe injury.
**Materials and methods:** The study involved 91 patients who entered the Odessa Regional Hospital with traumatic injuries: concomitant skeletal trauma, fractures of femur and humerus. Patients were divided into 2 groups: 1st group (n=46) as a treatment was received PCC in a dose of 1 ml/kg (25 IU/kg) and TXA in a loading dose of 1g during 10 minutes followed by an infusion of 1g during 8 hours at time of admission to the intensive care unit (ICU); 2nd group (n=45) received FFP in a dose of 15 ml/kg and TXA in a loading dose of 1g during 10 minutes followed by an infusion of 1g during 8 hours. Evaluation of the functional state of the hemostasis system was carried out using low-frequency piezoelectric thromboelastography (LPTEG) on admission to hospital and 24 hours after the patient's admission to the ICU.
**Results and discussion:** According to LPTEG indicators traumatic injuries patients has a statistically significant abnormalities in all parts of hemostatic system: platelet aggregation - Intensity of contact coagulation (ICC), the coagulation - Intensity of coagulation drive (ICD), clot maximum density (MA) and fibrinolytic activity - Index of retraction and clot lysis (IRCL). ICC in patients with traumatic injuries was reduced by 29.59%, ICD was less than normal at

37.59%, MA was reduced by 74.71%, which showed coagulopathy, IRCL was 90,78% above the norm, which stands expressed hyperfibrinolysis. Patients of 1st group according to LPTEG had significant changes in all parts of coagulation 24 hours after the intensive care. Indicators of platelet hemostasis characterized by persistence of hypoagregation: ICC was reduced by 24.71%, compared to the norm; parameters of coagulation and fibrinolysis have reliable trend toward normal and decreasing the activity of fibrinolysis index reaches normal reference values. Patients of 2nd group have hypoagregation and hypocoagulation state with decreased active of fibrinolysis: ICC was reduced by 24.72%, ICD reduced by 20.76%, MA was reduced by 23.54%, IRCL was in the normal range.
**Conclusion:** Patients with trauma-induced coagulopathy have violation in all parts of hemostatic system. The use of prothrombin complex concentrate and tranexamic acid can reduce the severity of pathological changes in the hemostasis in patients with traumatic injuries.

## 12AP02-3

### Does attending an advanced life support course as a final year medical student improve key non-technical skills during CPR

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**Background and Goal of Study:** Advanced Life Support (ALS) aims to teach the provision of standardised and evidence based resuscitation algorithms. It also states one of its specific learning outcomes as *"[to] utilise non-technical skills (NTS) to facilitate strong team leadership and effective team membership."*[1]
Our centre provides a multi-disciplinary fully-immersive simulation course for final year medical and nursing students. We defined key performance indicators (KPIs) during resuscitation of a cardiac arrest, which directly relate to team resource management and observed the impact of attending an ALS Course.
**Materials and methods:** A video analysis of 19 identical cardiac arrest scenarios was performed. Students had recently attended an ALS course in half of these scenarios. The KPIs selected echoed two major principles taught on ALS. To minimise interruptions in chest compressions, and early defibrillation of a shockable rhythm. A return of spontaneous circulation was simulated following the delivery of two simulated shocks by a confederate.
**Results and discussion:** The timings from the video analysis are shown in the table.

| Key Performance Indicator (times expressed as seconds) | Attended ALS (n=10) | Not Attended ALS (n=9) | P Values |
|---|---|---|---|
| Recognition of cardiac arrest to starting CPR. | 11 | 8 | 0.90448 |
| Recognition of cardiac arrest to defibrillator attached and turned on. | 56 | 69 | 0.79468 |
| Recognition of VF to first shock. | 32 | 42 | 0.87288 |
| Time off chest. | 64 | 68 | 0.25014 |
| Was there a clear hands off leader? (%) | 20 | 89 | 0.005477 |

*[Comparison of KPIs]*

Statistical analysis of the timings was carried about using the Mann Whitney U Test. Fischers Exact test was used to analyse the effect of ALS on team leadership.
**Conclusion(s):** In order to maintain situational awareness, it is important that the leader of the cardiac arrest team is devolved of technical tasks such as CPR. We demonstrated in this short audit project that attendance at an ALS course has no statistically significant effect *(p=0.05)* on any of the timings that we measured. Those candidates who had attended an ALS course, were far less likely to act as a "hands off leader" during the scenario (significant at *P=0.05*) and so were at increased risk of losing their situational awareness by becoming task focused. We recommend that the resuscitation council put more of an emphasis on the important non-technical skill of leadership and incorporate this into their scenarios.
**Reference:**
1. https://www.resus.org.uk/information-on-courses/advanced-life-support/ Accessed 3rd December 2015

## 12AP02-4

### Outcome prediction in patients with traumatic brain injury based on the dynamics of syndrome of tissue destruction and hypoxia

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**Goal of Study:** To examine the role of hypoxia and tissue destruction in predicting of outcomes in patients with TBI.
**Materials and methods:** We conducted a comparative study flowing from the brain and blood peripheral venous blood in 26 patients with TBI admitted to the ICU. The average age of the patients 36.8 ± 5.3 years and admission GCS - 7 ± 2 points.
**Results and discussion:** The level of lactate in all patients was higher than normal: on the first day by 10-15%, in the 3rd day the difference increases to 20-23%. Patients with fatal outcome lactate concentration (LC) in the peripheral blood was beginning to exceed that in blood flowing from brain, this ratio was maintained until death. In patients with a favorable outcome LC after 3 days it decreases as the jugular vein, and in the peripheral blood and the difference in levels of leveled. The concentration of CK in the blood flowing from the brain higher than that in the peripheral blood at day 1 by 7-8%. By the 3rd day the difference is already 25%. After this time, CK levels decreased, with the continuing trend to higher levels in the blood flowing from the brain down to 10 days. There was a clear trend to a higher level lactataemia in patients with unfavorable outcome. CK levels continued to increase, reaching a maximum value on the 3rd day in all patients. Surviving patients CK levels increased in the 3rd day by 39.7%, and the dead - by 65.8%. After 3 days its level gradually decreased in almost all patients. In patients with a favorable outcome of the high levels of the enzyme remained until 5th day of observation, significantly reduce the 10th day. In patients with high levels of fatalities CK, exceeding the original values preserved for nearly a week. It was found a direct correlation between the level of hypoxia and GCS. The low points of GCS in the group with poor outcome was accompanied by higher levels of creatine kinase and lactate. In survivors, the ratio was reversed.
**Conclusion(s):** In patients with TBI level of CK and LC can be reliable markers of neuronal damage. Above are unfavorable prognostic indicators remain high after 3 days from the date of injury.

## 12AP02-5

### Prospective evaluation of a goal-directed haemostatic therapy protocol for neurotrauma

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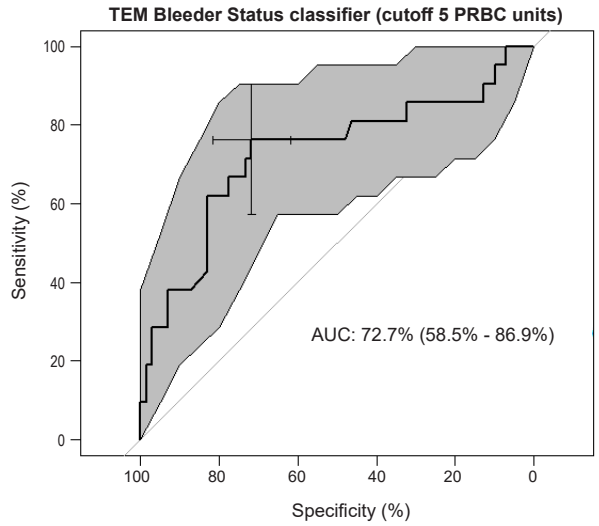
**Background and Goal of Study:** Intracranial or neuraxial bleeding lead to catastrophic consequences. Hemostatic treatment is therefore paramount. We evaluated a goal-directed protocol for hemostatic treatment in trauma cases by comparing the predictive power of thromboelastometry (TEM) vs. a panel of blood coagulation tests (CTs).
**Materials and methods:** Recruitement went from January 2011 to December 2012, after approval from the local ethics comitee. Outcomes were bleeding (number of PRBC units administered intraoperatively), and CTs (prothrombin time, activated partial thromboplastin time, fibrinogen levels, and platelets) obtained on the first postoperative day (POD1). Inclusion criteria were emergency surgery lasting more than an hour, and head injury or multiple trauma including head or spine with Glasgow Coma Scale (GCS) <13. Pregnant and pediatric patients were excluded. CTs and TEM were performed on admission, and on POD1. TEM was performed intraoperatively to guide hemostatic treatment. Information on transfusions, hemostatic treatment, and major adverse events was collected.
High-bleeder and low-bleeder groups were defined (≥ 5 PRBC units cutoff). TEM and Cts indices were built by predictor summation, and used in regression. Coagulation was analyzed through linear regression, while bleeding prediction used a Poisson model. Logistic regression was performed based on the transfusion cutoff. Mean square error and residual deviance were used as an index of prediction power.
**Results and discussion:** Twenty-one high bleeders and seventy-one low bleeders were recruited. Groups were similar regarding patient and surgical features. The median amount of PRBC units transfused was 2 (interquartile

25-75%, 0-4). 25 patients were not transfused. Both TEM and CTs were associated with transfusion ($p < 0.01$). TEM was a better predictor regardless of bleeder status. Binary prediction for bleeding showed a nonsignificant trend ($p = 0.0506$) in favor of TEM (figure 1). TEM was not significantly associated with POD1 CTs either. Maximal clot firmness and A15 values were the best TEM predictors for both outcomes. Neither TEM nor initial CTs were associated with perioperative death, presence of postoperative complications, or postoperative bronchopneumonia.

**Conclusion(s):** Our study suggests that TEM can be used for bleeding risk stratification. More trials using TEM-based goal-directed therapy will be required to evaluate its impact on postoperative outcomes.




*[Figure 1: TEM index vs. bleeder status ROC curve]*

## 12AP02-6

### Isolated traumatic brain injury as a cause of early coagulopathy

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**Background:** Trauma induced coagulopathy has been reported in cases of isolated traumatic brain injury(ITBI) and is associated with high mortality and morbidity. Approximately one third of patients with ITBI have associated coagulopathy. We describe a case of ITBI were the thromboelastogram (TEG) was the only warning sign of the ensuing coagulopathy.

**Case report:** A 77 years-old female with history of hypertension and diabetes mellitus, treated with aspirin, fell down multiple stairs resulting in head trauma and loss of consciousness. Assisted on scene with GCS 7, was intubated and transported to the ER of our hospital. She was evaluated by Neurosurgery, head CT showed acute subdural hematoma in fronto-temporo-parietal right side. No other injuries or signs of active bleeding were identified. First analytical evaluation was normal but a blood sample for TEG was collected before the patient went to the operating room. During craniotomy she developed hemodynamic instability requiring norepinephrine and signs of coagulopathy. The results of the first TEG showed absence of clot formation and transfusion support was initiated (4 RBC, 1 PLT, 2g fibrinogen, 3 FFP). There was clinical improvement, allowing for surgery conclusion, and a post-transfusion TEG showed normal clot formation. Admitted to the ICU with a GCS 3, the patient died 24 hours later of the neurologic injury.

**Discussion:** The management of patients with ITBI includes avoidance of hypoxemia, hypotension, and prevention of secondary brain injury and intracranial hypertension. The coagulopathy associated with trauma may appear with ITBI and contributes to secondary brain injury. It is associated with a poor prognosis, so an approach that includes an early identification of these patients is essential, especially if there is a need to surgical decompression as was the case.

**Reference:**

Int. J. Care Injured 45 (2014) 819-824;Neurocrit Care (2010)12:211-219

**Learning points:** TEG may detect early changes in coagulation in trauma patients, long before clinical signs are present, and is useful in transfusion orientation especially in the case of emergency surgical management. Our targeted and timely action allowed rapid control of the bleeding urging surgery. Patient prognosis was very poor, not having our approach changed the outcome. However this clinical report illustrates the need to keep in mind that an early intervention and use of TEG are essential, even before a clinical suspicion is present.

## 12AP02-7

### Perfused Boundary Region remains stable after short time experimental cardiac arrest in pigs

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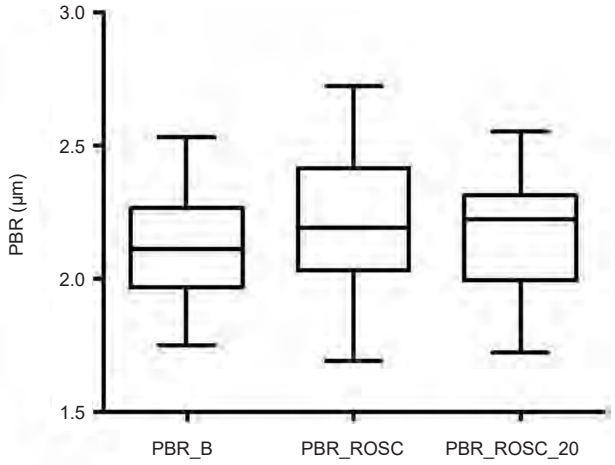
**Background and Goal of Study:** Endothelial glycocalyx (EG) plays key role in maintaining vascular integrity, perturbation of the EG in patients after cardiac arrest has been described by measuring syndecan-1 and heparan sulphate levels [1]. Non-invasive method of evaluating EG thickness by using Perfused Boundary Region (PBR) has been introduced just recently [2]. The aim of the study was to evaluate changes in PBR on porcine model of cardiac arrest in order to assess the usefulness of PBR as an indicator of glycocalyx damage.

**Materials and methods:** Cardiac arrest (CA) was induced by inserting intracardiac electrode triggering ventricular fibrillation and treated by defibrillation after 15 minutes of CA. Blood pressure, heart rate, sublingual microcirculation was recorded and PBR computed automatically with specialized software (GlykoCheck glycocalyx measurement system) at three time points: baseline (PBR_B), after return of spontaneous circulation (PBR_ROSC) and 20 minutes after ROSC (PBR_ROSC_20). Data are presented as a mean (SD), statistical analysis was done by using GraphPad Prism, $p \leq 0.05$ was considered as statistically significant.

**Results and discussion:** PBR data was obtained from 11 pigs. PBR did not change significantly after ROSC ($p = 0.26$) (figure 1). The PBR_B was 2,129 (± 0,21), PBR_ROSC was 2.206 (± 0,27) and PBR_ROSC_20 was 2,18 (± 0,19).




*[Figure 1]*

**Conclusion(s):** Our data demonstrate that PBR was preserved after 15 min of cardiac arrest (Figure 1). The value of PBR as indicator of glycocalyx shedding requires further study before introducing this parameter as a routine non-invasive tool in pig model of glycocalyx damage.

**References:**

1. Grundmann S, Finka K, Rabadzhieva L, et al. Resuscitation. 2012; 83: 715-720
2. Lee DH, Dane MJ, van der Berg BM, et al. PloS One. 2014; 9(5): e96477

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## 12AP02-9

### Cerebral state index and brain death

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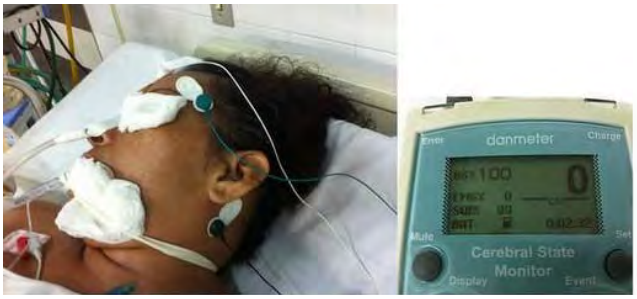
**Background:** Derived from an analysis of cortical and subcortical parameters of electrical brain activity, the cerebral state index (CSI) is used to monitor depth of anesthesia. The index is displayed on a monitor fed by two channels of EEG signals from the SNC. Values range from 0 (no activity) to 100 (wake state). Burst suppression rates (BSR) different from zero (normal) may indicate hypoperfusion. Electromyographic activity (EMG) is zero when very little or no electrical activity is present in the bulbopontine region, and different from zero in the wake state. Brain death is defined as complete and irreversible loss of brain function, including that of the brain stem.
**Case report:** A 55-year old patient with a history of systemic arterial hypertension and medicated with atenolol (50 mg/day) was hospitalized due to thunderclap headache and loss of consciousness. Subarachnoid hemorrhage was observed on CT, and EEG activity was suppressed. The patient was intubated, placed on mechanical ventilation and monitored with a CSI device, but was eventually diagnosed with brain death. The CSI-measured parameters were BSR=100%, CSI=0, EMG=0. At this time, the patient was not under the effect of anesthetics or neuromuscular blockers.
**Discussion:** The monitored parameters (CSI, BSR and EMG) indicated severe compromise of both cortex and brain stem in a patient diagnosed with brain death, suggesting depth-of-anesthesia monitors may be used to diagnose brain death non-invasively. However, further studies are required to demonstrate the ability of depth-of-anesthesia monitors to satisfy legal requirements for the establishment of brain death.




*[Brain death]*

**References:**
Fyntanidou B, Grosomanidis V, Aidoni Z, et al. Bispectral index scale variations in patients diagnosed with brain death. Transplantation Proceedings, 2012,44, 2702-2705.
Jacobsohn E, De Wet C, Tymkew H et al. Use of the patient state index (PSI) to assist in the diagnosis of perioperative neurological injury and brain death, 2005;19:219-222.
**Learning points:** Depth-of-anesthesia monitors could be helpful in brain death confirmation but cannot replace the valid clinical tests.

## 12AP02-10

### Single administration of fluoxetine improves memory function without neuroprotection after cardiac arrest/cardiopulmonary resuscitation in mice

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**Background and Goal of study:** Several clinical studies have indicated that serotonin re-uptake inhibitor (SSRI) administration after acute ischemic stroke can improve clinical recovery. Fluoxetine (FLX: one of the SSRIs) has several mechanisms which contribute to relieve the ischemic brain damage. We have previously reported that FLX had neuroprotective effects on day3 after cardiac arrest and cardiopulmonary resuscitation (CA/CPR) in mice. However, the neuronal loss after global ischemia is suspected to continue up to 14 days after insults. The goal of this study is to evaluate the neuroprotective effect of FLX for a longer observation period.
**Material and methods:**
PROTOCOL 1: Global cerebral ischemia was induced in male C57BL/6 mice for 7 minutes of CA. Thirty minutes after recovery of spontaneous circulation, the mice were randomly assigned to 2 groups and administered either FLX 10 mg/kg (Group F: n = 12) or 0 mg/kg (Group C: n = 12). Six and seven days after CA/CPR, behavioral tests (passive avoidance test) were conducted and brains were removed for histological evaluation.
PROTOCOL 2: Methods of global ischemia and behavioral test were same as protocol 1. Fourteen days after CA/CPR, behavioral tests and histological evaluations were similarly conducted. (Group F: n=24, Group C: n=24) Data are presented as mean±SEM, and the groups were compared by unpaired t test or Mann-Whitney U test. The $\chi^2$ test was used for survival analysis.
**Results and discussion:** Seven days after CA/CPR, there was a significant difference in number of surviving neurons (Neu-N positive cell) between the groups. On day14, the difference disappeared. However, Group F showed a significantly greater number of immature neurons (Doublecortin positive cell) than Group C. No differences were found in number of microglia (IBA-1 positive cell). At this time point, memory function significantly improved in Group F. The previous study has shown that the neurogenesis in hippocampus modulates the hippocampus-dependent period of memory, without loss of memory. The functional recovery in this study may have been induced by neurogenesis in hippocampus.
**Conclusion:** Fluoxetine improved memory function after cardiac arrest. This recovery may be due to neurogenesis in hippocampus, but not due to surviving neurons. Further investigation is needed to clarify the interaction of memory function and neurogenesis after fluoxetine administration.

## 12AP03-1

### The importance of reporting adverse drugs effects - cardiac arrest due to gentamicin

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**Background:** Nephrotoxicity causing symptomatic hypomagnesemia, hypocalcemia, and hypokalemia occasionally develops in patients treated with aminoglycosides, especially gentamicin[1]. Cardiac arrest also is found especially amoung people who are >60 years old[2], representing 2,08% of all reported side effects of gentamicin in FDA.
However in the Portuguese National Pharmacovigilance System (PSNF) no cardiac effects were reported. We present a case of a healthy patient with a septic abortion treated with gentamicin that developed an unexpected cardiac arrest.
**Case report:** A 31-year-old healthy female was admitted to the obstetrician department with a three days small vaginal bleeding. She was diagnosed with 12 weeks septic abortion, starting antibiotic protocol with gentamicin. It was performed an instrumented evacuation under balanced general anesthesia without complications. Seven hours later Medical Emergency Team (MET) was activated for altered state of conscience. At our arrive, she was found in ventricular fibrillation, which was reversed after two advanced life support cycles. The patient regained conscience and was admitted to the intensive care unit (UCI) for study and surveillance. EKG and serial echocardiograms documented normal heart activity. Analytically were found severe hypokalemia, hypophosphatemia, hypomagnesemia and hypocalcemia. The potas-

sium/creatinine ratio (K/Cr) was 64 mEq/L, very suggestive of renal potassium losses. These ionic changes, leading to cardiac arrest, were attributed to renal tubular toxicity, probably associated with gentamicin. The antibiotic was stoped, ionic changes corrected and the patient was discharged from ICU the next day. The case was reported to the SNF and it was considered that the clinical event occurred with an acceptable temporal and casual relationship with concomitant diseases or other drugs being unlikely.
**Discussion:** According SNF case revision and World Health Organization classification, gentamicin is considered to be the probable cause of hyperkalemia, ventricular fibrillation and cardiac arrest. The MET elements must have a high index of suspicion of all drugs used when there are atypical clinical situations. This case enhance the importance of reporting drugs adverse reactions to the SNF.
**References:**
1. Kidney Int. 2011;79(1):33-45.
2. http://www.ehealthme.com/ds/gentamicin/cardiac+arrest

## 12AP03-2

### Identifying the ASA grade prior to Fracture neck of Femur surgery: Underestimating the risk?

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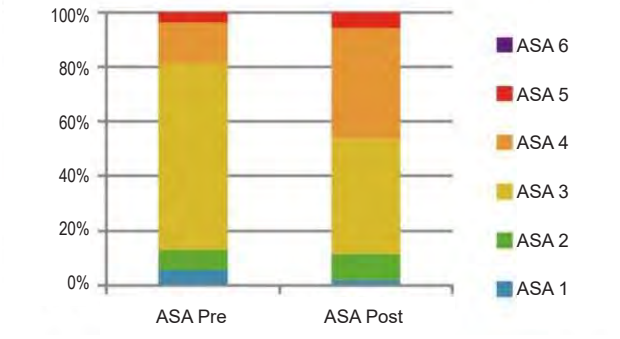
**Background and Goals:** Fracture neck of Femur (FNOF) accounts for 77000 patients annually in the UK, with 10% mortality at 30 days and 1.5 million hospital bed stays. The anaesthetic challenges posed by this medically complex patient group are significant. The ASA grade is a major element in the risk assessment. Recognising the multiple comorbidities can be hampered by need for urgent surgery- also, 1 in 4 patients suffer from cognitive impairment. Delaying surgery for detailed medical notes to ‚get the full picture' can lead to longer hospitalisation/worse outcomes.
This retrospective survey looked at the identification of the ASA grade of the patients with FNOF between Jan-March 2014 at our institution.
**Materials and methods:** The ASA scores were calculated from the data available at admission from the Emergency Department (ED). This is the real life situation where patients are planned for urgent surgery.
The ASA scores were then recalculated using an electronic search tool (EST), designed by one of us in conjunction with the Information Technology team at our institution. EST examines the clinical and non clinical databases the organisation has over a 10 year period, using the identifier of the ‚NHS number'. The EST generates an abbreviated list of attendance at various clinics, hospital admission episodes, names of treating specialties, diagnoses proposed, any investigations made. The scores generated were compared.
**Results and discussion:** 53 patients were included, 76% were females. The median age was 87 years (range 61-103).
In 94% of the patients the ASA grades had at least one comorbidity added when the EST was used, resulting in changes to ASA grading. Crucially the majority were recategorised from ASA 3 to 4.




*[ASA Grades Pre Post]*

**Conclusions:** The EST provided a more comprehensive understanding of the comorbidities associated in this patient group. Importantly, the information would be available at the ED, had the tool been in use. We believe that using this tool would have an impact on the speed of listing to surgery, resource allocation perioperatively as well as potentially improving outcome in this vulnerable patient group.

## 12AP03-3

### Portuguese non-teaching hospital rapid response team's performance in cardiac arrest

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**Background and Goal of Study:** We intended to audit our rapid response team's (RRT) performance in in-hospital cardiac arrest and compare it to benchmark, identify potential pitfalls and seek opportunities for improvement.
**Materials and methods:** Our team consists of a doctor and a nurse on call for all critical events happening inside the hospital, excluding the emergency department. Our RRT may be activated for events on admitted patients, visitors or staff.
We retrospectively analysed the RRT's performance of CPR during 2014. We evaluated response times, 1st documented rhythm and outcomes for return of spontaneous circulation (ROSC) and survival to discharge. We also examined the cases in which CPR was initiated without knowledge of a previous DNAR order.
**Results and discussion:** Of the total 333 events that occurred during the period of study, CPR was performed in 44 cases. Most frequent first rhythm documented was asystole (54,5%), second being PEA (29,5%) and lastly VF/pulseless VT (15,9%). Any ROSC was obtained in 71% of VF/pulseless VT cases, 50% of asystole cases and 69% of PEA. Survival to discharge on all rhythms was 16%, specifically 17% for asystole, 29% for VF/pulseless VT cases and 8% for PEA. In 5 cases RRT contact and CPR was initiated unaware of DNAR order. Mean time to arrival on code was under 3 minutes.
**Conclusion(s):** Our data evidences proportionately more cases of asystole comparing to international data[1], which may reflect delayed recognition of arrest. Despite this, survival to discharge is comparable (16% vs 18%). Interestingly, all cases of DNAR orders for which our team was called happened on weekends which may reflect that attending personnel was unaware of this orders and has alerted us for the need to alter this registry in patients' charts.
**References:**
1. Circulation.2013;127:1538-1563

## 12AP03-4

### An advanced reanimation procedure with the mechanical chest compression system on a pregnant patient with arrhythmogenic right ventricular cardiomyopathy (ARVC)

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Although cardiac arrest during pregnancy is extremely rare, there should be well-planned strategies in place for its management in all hospitals. Accordingly to the resuscitation guidelines, immediate resuscitation in pregnant patients is crucial and requires coordinated action of the team of gynaecologists, obstetricians and anaesthesiologists.
Recently, we used the mechanical chest compression system on a pregnant patient with a positive outcome as the baby has been saved. A patient, age 40 with a severe obesity (over 100kg), was admitted on the 30th week of pregnancy due to signs of the pre-eclampsia, hypertension and deep vein thrombosis. She was pregnant for the seventh time, with a history of two premature deliveries, one stillbirth and with previous cardiac arrest during pregnancy. After the episode of sudden cardiac arrest during the sixth pregnancy, patient was referred for a cardiological consultation.
ECG and Echo tests were normal without obvious pathological abnormalities. The size of ventricles was unchanged and systolic function was preserved. MRI showed some fat deposits in the right ventricle. After hospitalisation, at the ward, patient had a sudden cardiac arrest. We used mechanical compression system that allowed us to significantly reduce reaction time while keeping tissues properly perfused and oxygenated. We had to terminate the pregnancy by the caesarean section and performed radical hysterectomy.
We performed cardiopulmonary resuscitation for 3 hours 10 minutes in total, while the mechanical compression system was used for 2 hours 50 minutes. Although we did not manage to save the mother, the baby was discharged in overall good condition after 45 days. The mechanical compression system allowed us to optimise the usage of human resources, minimise the intervals

between compressions and provides a constant compression force with the frequency of 100 per minute.
Due to the underlining conditions and pregnancy it was difficult to get the right diagnosis. High mortality risk is associated with ARVC which in this case of this patient was additionally increased by the pregnancy. Although we did not manage to save the patient, mechanical compression system improved reanimation and allowed us to perform caesarean section and to introduce endocavitary electrode.
In summary, the mechanical compression system can clearly improve the efficacy of resuscitation in pregnant patients.

## 12AP03-5

### Successful open-chest cardiopulmonary resuscitation after anaphylactic shock

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**Background:** Anaphylaxis is the most dramatic clinical presentation of allergy.[1] Whereas skin and respiratory tract are most frequently involved, dysfunction of the cardiovascular system usually dictates the outcome.[1] The number and density of cardiac mast cells is larger in patients with heart disease,[1] thus posing an extra risk for serious anaphylactic shock in the event of allergen exposure.
**Case report:** A 64-year-old male presented to the operation room for aortic valve replacement. He had an exuberant skin rash and reported discomfort. Vancomycin perfusion was stopped immediately. The patient was monitored, showing bradycardia and hypotension. Adrenaline, clemastine, ranitidine and hydrocortisone were administered intravenously. Meanwhile, the patient lost consciousness progressing to cardiac arrest in ventricular fibrillation (VF). Cardiopulmonary resuscitation (CPR) was initiated with precordial thump, followed by advanced life support algorithm including external defibrillation, adrenaline and amiodarone. After 40 minutes of unsuccessful CPR, always in VF, the team decided to proceed to sternotomy and open-chest CPR. The patient recovered spontaneous circulation after the first defibrillation with internal paddles at 15J. An adrenaline infusion was then started and surgery proceeded with extracorporeal circulation and hypothermia of 32ºC. Serial mast cell tryptase values lowered from over 200ng/mL (2hours) to 8.5ng/mL (24hours). At 3-month follow-up evaluation the patient has total amnesia for the event and minor neurologic complaints (bilateral hand paraesthesia and a slight memory impairing).
**Discussion:** Open-chest CPR has proved to be hemodynamically superior to closed-chest CPR but is only recommended in post-cardiac surgery patients.[2,3] As internal paddles increase efficacy of defibrillation, refractory VF may be an indication for open-chest CPR. Extracorporeal circulation with hypothermia probably contributed to the excellent outcome, providing a good oxygenation and quick recovery of acidosis and hypercapnia. Aortic valve replacement also improved cardiac function, promoting recovery.
**References:**
1. ClinExpImmunol.2008;153Suppl1:7-11;
2. Resuscitation.2015;95:100-47;
3. Resuscitation.2005;64(2):149-56.
**Learning points:** To the best of our knowledge, this is the first report of successful open-chest CPR after an anaphylactic shock. Open-chest CPR should be considered as a rescue treatment for cardiac arrest in refractory VF.

## 12AP03-6

### Evaluation of the cardiotoxicity and resuscitation of a newly developed mixture of QX-314 analogue and levobupivacaine in rats

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**Background and Goal of Study:** The purpose of this study was to evaluate cardiotoxicity of a newly developed local anesthetic LL-1, the mixture of QX-314 analogue (QX-OH) and levobupivacaine in comparison of each component, and to compare the rate of successful resuscitation after cardiac arrest caused by LL-1, QX-OH, and levobupivacaine.
**Materials and methods:** The “up-and-down” method was used to determine the $ED_{50}$ of LL-1, QX-OH, and levobupivacaine in producing electrocardiographic change/cardiac arrest in rats. Isobogram was used for drug interaction analysis. Then 1.2-fold $ED_{50}$ for cardiac arrest of the three drugs was injected through tail vein. Mechanical ventilation with 100% oxygen and chest compressions were given immediately after cardiac arrest. Epinephrine 0.01 mg/kg was administered at 1-min interval until return of spontaneous circulation (ROSC) with native rate-pressure product (RPP) $\geq$ 30% baseline for 5 min. Electrocardiogram and arterial pressure were monitored for the following 60 min. Arterial blood gas was measured at 0 min (baseline), 15 min, 30 min, 45 min, and 60 min after ROSC.
**Results and discussion:** The $ED_{50}$ for cardiac toxicity and cardiac arrest of LL-1 were 8.39 mg/kg (95% CI, 7.43 to 9.47 mg/kg) and 45.95 mg/kg (95% CI, 38.35 to 54.98 mg/kg) respectively, higher than 2.97 mg/kg (95% confidence interval [95% CI], 2.30 to 3.85 mg/kg) and 19.31 mg/kg (95% CI, 16.52 to 22.57 mg/kg) of levobupivacaine, but lower than 10.40 mg/kg (95% CI, 9.34 to 11.57 mg/kg) and 78.17 mg/kg (95% CI, 74.46 to 82.08 mg/kg) of QX-OH. Isobogram analysis revealed antagonistic effect referring to cardiotoxicity in mixure of QX-OH and levobupivacaine (LL-1). Initial successful resuscitation was achieved in rats received LL-1 and levobupivacaine; however, 6 of 8 rats survived from high dose of QX-OH ($p < 0.05$). Noticeably, recurrent bradycardia and hypotension were developed in QX-OH and LL-1 groups 20 min and 50 min after drug administration.
**Conclusion(s):** QX-OH and levobupivacaine produced concentration-dependent cardiotoxiciy. The order of potency in cardiotoxicity of LL-1 and its components are: bupivacaine > LL-1 > QX-OH. Although specific mechanism remains unknown, combination of QX-OH and levobupivacaine resulted in antagonistic cardiotoxicity. Mechanical ventilation, chest compression, and epinephrine provided satisfactory rate of successful resuscitation.

## 12AP03-7

### Cardiac arrest in operation room - risk factors for poor outcome

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**Background and Goal of Study:** Unexpected perioperative cardiac arrest is a rare event (1). During emergency operations for unstable patients there is always a risk for cardiopulmonary resuscitation. The current resuscitation guidelines emphasize prevention of in-hospital cardiac arrest (3). The aim of this pilot study was to analyze the risk factors of perioperative cardiac arrest.
**Materials and methods:** Data about perioperative cardiac arrests was extracted from the electronic patient records (Picis, Uranus) of the operation room of Meilahti hospital, Helsinki, Finland during years 2010-2014. The OR is one of the busiest in Finland, having 12 400 operations per year, 6 550of them emergencies.
**Results and discussion:** During five years, there were 81 patients (50 male, 31 female) having perioperative cardiac arrest and 51 of them died. Cardiac arrest took place in emergency operations (70% vs. 83%). Those who survived were more often operated on during office the hours than those who died (70.0% vs. 54.9%). Majority of those who died, (group D), arrived from the emergency room than those who survived (group S), 83% vs. 70%., respectively ($p<0.01$). Patients in both groups were had high ASA grading and majority of them were elderly having multiple diseases. Twenty-one patients (41.2%) of group Died were resuscitated even before anaesthesia induction, initial rhythm being VF in nine cases, PEA in 6, ASY in two cases.
In both groups cardiac arrest took place during the operation (group S 50.0%, group D 54.9%)(NS). In group D, the most common rhythm was PEA (80.4%

in group D vs. 60.0% in group S)($p<0.05$), followed by ASY (20.0% vs 17.6%) and VF 1.9% vs (20.0%). In group D, 67% of patients were resuscitated twice or more before the team decided not to start a new intraoperative attempt. In group S 76.7% of patients had perioperative noradrenalin infusion and 84.3% in group D 84.3%, the latter group had also other vasoactive infusions. Of those who survived surgery, 13 died later, 13 were transferred to a ward in other institution and five were discharged home.
**Conclusion(s):** Preoperative cardiac arrest and emergency operation outside office hours are associated with poor outcome. The most frequent cause of death was failing haemodynamics. Further studies are needed is order to confirm the risk factors emergency anaesthesias.
**References:**
1. Andres J. et al. EJA 2013; 30: 95-96.
2. Truhlar A et al. Resuscitation 2015; 95: 148-201.

## 12AP03-8

### Progressive hypoxia causes reversible left ventricular D-shaping in an experimental porcine model

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**Background and Goal of Study:** In echocardiography, a pulmonary embolism is characterized by D-shaping of the left ventricle. The specificity of this characteristic has recently been challenged, as hypoxia induced by acute asphyxia resulted in similar D-shaping. Decompensation of respiratory distress most often manifests as progressive hypoventilation. Therefore, we aimed to evaluate the left ventricular ultrasonographic appearance of progressive hypoventilation using a porcine model.
We hypothesized that progressive hypoventilation would lead to a gradual D-shaping of the left ventricle.
**Materials and methods:** Fifteen piglets (intervention n=10 control n=5) were included in the study. The intervention piglets underwent three ten-minute periods. Baseline, respiratory frequency (RF)=16 Tidal volume (TV)=240mL. First intervention RF=8, second intervention RF=4 and third intervention RF=4 and TV=120. Respiratory resuscitation began after the third intervention or if MAP<50% of baseline. Parasternal short axis view cineloops were stored and arterial blood samples were drawn after 3, 6 and 9 minutes at each level of hypoventilation. During resuscitation, cineloops were stored every minute and arterial blood samples drawn every second minute.
**Results and discussion:** Left ventricular eccentricity index (LV-EI), an ultrasonographic index of D-shaping, increased from 1.1 (1.0-1.1) at baseline to 1.4 (1.3-1.4) three minutes into the final intervention ($P<0.001$). After two minutes of respiratory resuscitation, LV-EI returned to baseline (1.1 (1.1-1.2), $P=0.093$) and stayed at this level ($P=0.348$).
Progressive hypoventilations yield a reversible echocardiographic image, which to many clinicians is synonymous with pulmonary embolism. Our findings challenge D-shaping as a specific rule-in diagnostic marker, and repeated echocardiography after reoxygenation may prove an important differential diagnostic tool.
**Conclusion(s):** Progressive hypoventilation causes reversible D-shaping of the left ventricle and poses a differential diagnosis to pulmonary embolism.
**Reference:**
Sorensen, A.H., et al., *Asphyxia causes ultrasonographic D-shaping of the left ventricle - an experimental porcine study.* Acta Anaesthesiol Scand, 2015

## 12AP03-9

### Anaesthetic equipment recognition and orientation (AERO) project

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**Background:** Our hospital Emergency Department (ED) is a busy and stressful environment where Anaesthetists are frequently called to help deal with incoming emergencies. In these situations, it is essential to promptly locate equipment in order to treat incoming patients efficiently.[1] Until recently, our ED has had limited cataloguing of emergency drawers and cupboards, and anaesthetists have had no specific training or familiarisation with their contents or arrangement. Our project's aims were:
1) To create a logical, uniform layout of emergency equipment in the ED
2) To familiarise anaesthetic staff with the location of emergency equipment
3) To facilitate effective re-stocking of emergency equipment
**Methods:** Using a standardised approach, we labelled all drawers in each resuscitation bay of the ED. Then, we undertook a familiarisation process with the Anaesthetists, which involved creating an interactive photographic familiarisation guide and giving them a short presentation about it. Lastly we introduced a ‚sealed drawer system' by which nurses are able to identify areas that need re-stocking.
To assess the impact of our efforts, we administered a questionnaire to the anaesthetists before and after our intervention. This consisted of 6 questions asking about the location of various important items needed in an emergency. The questionnaire was thus scored out of 6. Mean scores before and after the intervention were compared by means of a paired t-test.
**Results and discussion:** 20 anaesthetists of varying grades completed both parts of the questionnaire.
Prior to our intervention, the mean score for correct answers was 0.55/6 (9%). Following the intervention, the mean score was 4.3/6 (72%) [$p=0.00003$]. This highlighted the impact of our simple interventions. The feedback received for the guide was encouraging, thus we intend to expand on the study by exhibiting our work to relevant departments and health professionals.
**Conclusion:** We have instituted an important change in a key location of the hospital, through which health professionals may easily orientate themselves effectively. Our staff have demonstrated an improved recognition of emergency equipment in the resuscitation bays and have exhibited a positive response to the new layout of the bays.
**Reference:**
1. Donaldson LJ et al. *Patient-Safety-Related Hospital Deaths in England: Thematic Analysis of Incidents Reported to a National Database,* PloS Med 2014 Jun 24;11(6)

## 12AP03-10

### Interventions to improve in-hospital cardiac arrest (IHCA) survival rate - a single center report

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**Background /Goal of Study:** Trends toward an improved survival rate in IHCA patients was recently demonstrated in both adult and pediatric patients (1,2). At a hospital level, evidence for beneficial interventions are scarce and controversial (3). We developped a program aimed at following the 2004 french guidelines (4). Our objective is to report on the effect of this program on IHCA survival over the last 7 years.
**Materials /Methods:** All IHCA were recorded on a database including demographic, location, comorbidity, initial rhythm, timing of treatments, length of stay, and outcome data. Interventions were : creation of a code number, 100% AED availability on wards, 2 successive code carts modifications, implementation of a staff education program (400 pax).We retrospectively analyzed the database over 13 half year categories. Chi-square test for trend was used to determine statistical significance of change in survival rate.
**Results /Discussion:** 393 IHCA patients were treated from 01/01/09 to 30/06/15. Overall incidence density was : 4.28/1000 stay. Overall mean value were : age : 71+/-11, non shockable rhythms : 56.7%, time to CPR 1.29 min, immediate survival (IS) : 66.2%, hospital survival (HS) : 44.8%. Mean age slightly increased while time to CPR decreased over the study period (NS).

Significant improvement in IS was reached after complete staff education. HS increase was reached after creation of the code number (26.7% to 45% ; p<0.05). No other intervention achieved statistically significant changes. Survival decrease was observed after each structural changes in the institution with subsequent changes in the case-mix (NS)(fig 1).

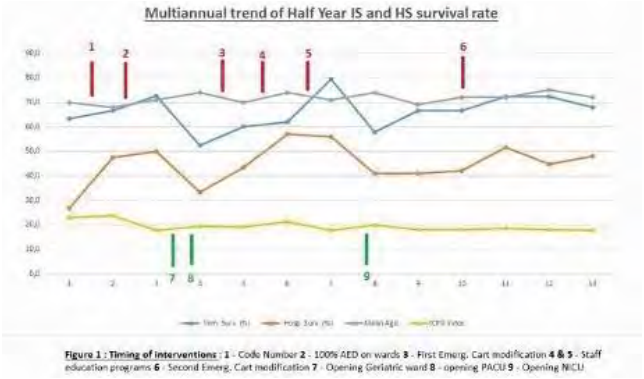


Figure 1 : Timing of interventions : 1 - Code Number 2 - 100% AED on wards 3 - First Emerg. Cart modification 4 & 5 - Staff education programs 6 - Second Emerg. Cart modification 7 - Opening Geriatric ward 8 - opening PACU 9 - Opening NICU

*[Fig 1]*

**Conclusion(s):** Guidelines implementation significantly improved HS in the institution. HS increased over time and never went lower than before intervention. Staff education provided the largest increase in IS. Variations in survival rate over time are related to structural and case mix changes in the institution. Multiannual half-year trends are usefull to assess the sustainability of improvements.

**References:**

1. NEJM 2012 ; 367 : 1912-1920
2. Circ.Cardiovasc.Qual.Outcomes 2013;6:42-49
3. JAMA 2010;304:2129-36
4. Réanimation 2005;14:671-79

## 12AP03-11

### The hemodynamic effect of lipid emulsion in diabetic rat model

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**Background and Goal of Study:** Lipid emulsion therapy is used to treat various drugs toxicities like those arising from local anesthetics, calcium channel blockers, etc. Lipid emulsions sequester lipophilic drugs in body tissues. Many studies have reported that lipid emulsions have inotropic effects, but the mechanism of those effects is not fully understood. We report that the inotropic effect of lipid emulsions is related to nitric oxide (NO) released from the endothelium of blood vessels. We studied the cardiovascular effects of lipid emulsion therapy in diabetic rats with endothelial damage.

**Materials and methods:** Streptozocin 80mg/kg was intraperitoneally administered to 8-week-old rats. 9 weeks later, we measured serum glucose, weight, cholesterol, HDL, and LDL in the rats. Experiments were performed with 17-week-old rats in both the diabetes mellitus (DM) group (n=7) and the non-DM group (n=7). 3ml/kg of Lipofundin® MCT/LCT 20% was injected via the femoral vein and 5 minutes later systolic, diastolic, mean blood pressure, heart rate, and rate pressure product (RPP) were measured via the carotid artery.

**Results and discussion:** DM rats showed lower body weight and higher serum glucose levels than non-DM rats. After lipid emulsion infusion, the SBP of DM rats increased to 138% while that of non-DM rats was 177% (p<0.01). RPP was raised to 123% in DM rats and 160% in non-DM rats (p<0.01). Diastolic blood pressure and heart rate were not different between the two groups.

**Conclusion(s):** In this study, we found that the cardiovascular effects of intravenous lipid emulsion are limited in a diabetic rat model. Intravenous lipid emulsion most likely had a limited impact on cardiac contraction as bioavailability of endothelial NO had already been reduced before the injection of LE from diabetes. Vascular smooth muscle dysfunction caused by diabetes may have led to a limited impact on cardiovascular function. As a result, we could suppose that lipid emulsion in diabetic patients would be limited in its cardiovascular effects.

**Reference:**

1. Systemic Blockage of Nitric Oxide Synthase by L-NAME Increases LVSP, Which is Not Augmented Further by Intralipid. (Int J Biol Sci. 2014;10:367-376)

**Acknowledgements:** This research was supported by the Basic Science Research Program through the National Research Foundation of Korea and funded by the Ministry of Education, Science, and Technology (NRF-2011-0021216).

## 12AP03-12

### Cardiac arrest followed by the administration of sugammadex in the patient with variant angina

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**Background:** Several cases reported the significant complications of the sugammadex such as hypersensitivity and anaphylaxis [1], but coronary spasm due to sugammadex is not reported yet. Here we represent an unexpected dysrhythmia and cardiac arrest was occurred in the patient with undiagnosed chest pain after administration of the sugammadex.

**Case report:** A 76-year-old male with a height of 169.7 cm and a weight of 65.2 kg was scheduled for a robot assisted radical prostatectomy under general anesthesia. He had no specific past medical history but suffered for infrequent atypical chest pain. Preoperative transthoracic echocardiography and electrocardiogram for cardiologic evaluation were performed but there were no abnormal findings except sinus bradycardia. The other preoperative tests were normal. The general anesthesia was induced with the propofol 120 mg and rocuronium 50 mg. Tracheal intubation was performed smoothly. The anesthesia was maintained with desflurane 6 volume % and remifentanil infusion at 0.1 μg/kg/min. Intraoperative vital signs were maintained within as follows systolic blood pressure: 90-100 mmHg; CVP: 10-15 mmHg; body temperature: 35.5-36.0. The operation was finished uneventfully and the operation time was 4 hours 15 minutes. When the operation was finished, we administered sugammadex. Two minutes later, ventricular premature contraction bigeminy was appeared, and then cardiac arrest occurred. Cardiac arrest was developed three times and cardiopulmonary resuscitation was performed. The patient recovered after third time of cardiopulmonary resuscitation and he was transferred to the intensive care unit. Coronary angiography was performed on the postoperative day 1, the patient was diagnosed as variant angina. The patient discharged on the postoperative day 8 uneventfully.

**Discussion:** In this case, the patient had three times of sudden cardiac arrest after administration of sugammadex. We presumed that the cardiac arrest resulted from acute myocardial infarction which was accompanied by coronary spasm. Although the cause of coronoary spasm is unclear, sugammadex might be a trigger factor of coronary spasm in a patient with variant angina.

**Reference:**

1.Tsur A, Kalansky A. Hypersensitivity associated with sugammadex administration: a systemic review. Anesthesia 2014;36(11):1251-7.

**Learning points:** Sugammadex might be a trigger factor of coronary spasm in a patient with variant angina.

## 12AP04-2

### Flows and fraction of inspired oxygen ($FiO_2$) in pediatric resuscitators: a comparison between a reusable and single use devices

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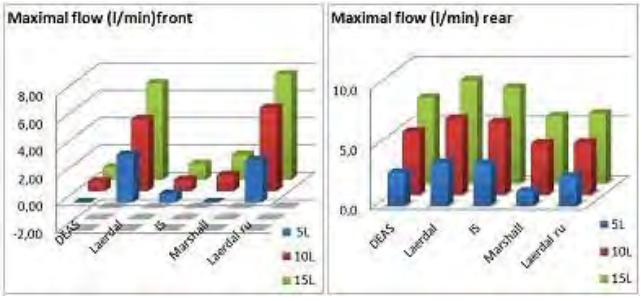
**Background and Goal:** Hospital use of reusable pediatric self inflating bags (Laerdal) entails high costs for purchase, repair and sterilization. The aim of this study was to compare the reusable Laerdal device to single use alternatives (DEAS, Laerdal, Intersurgical, Marshall) with regard to performance and costs.
**Methods:** $FiO_2$, flow, and time to reach maximum values were measured at different flow rates (5,10,15 l/min) at the front and rear side of the horizontal resuscitator. $FiO_2$ was determined during passive and active ventilation with/without the use of a reservoir bag. For each brand two resuscitators were tested during four runs per device.
Flow was measured with Certifier® Flow meter. Data was analyzed with Kruskall Wallis test. Post hoc comparison was performed with Dunn's test. Statistical significance was set at $p<0.01$.
**Results:** $FiO_2$ reached >95% in all bags at all flows, front and rear. Time to reach maximum $FiO_2$ at the front was significantly longer in all flows for Marshall.
Maximum front flow is significantly higher in Laerdal reusable and single use bags (fig 1).Time to reach maximum flow was significant longer for Marshall. Front flow was significantly lower than flow at the rear in DEAS, IS and Marshall bags at all flows. At 5L/min there is no significant difference between front and rear flow in Laerdal single use. At higher flows these values differ statistically (p=0,008), and a clear difference between the Laerdal single use bag and the three other single use bags is observed. In the reusable Laerdal resuscitator, free oxygen flow was highest at all flow rates at the front instead of at the rear. In all bags maximal flow at the rear end was reached within seconds during all flows. During active ventilation with/without reservoir bag overall FiO2 in both Laerdal bags were superior compared to the other bags at different flows. Purchase price is ±10€ for a single use and 170€ for a reusable bag. Total costs for sterilization are ±14€.
**Conclusion:** Single use Laerdal resucitators are a reliable alternative for their more expensive reusable equivalents. In the reusable Laerdal resuscitator, free oxygen flow was highest in all flow rates at the front end.




*[Figure 1. Maximum oxygen flow at the front and rear side of the resuscitator (ru = reusable)]*

## 12AP04-3

### Improved success rate and esophageal intubation incidence in out-of-hospital tracheal intubation performed by paramedics by use of video-laryngoscope: three-year experience of Hiroshima City emergency medical services

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**Background:** Out-of-hospital tracheal intubation (TI) is more difficult as compared to that performed in a hospital environment. However, personnel with insufficient skills such as paramedics may be required to perform TI in out-of-hospital settings. Also, TI using a conventional direct laryngoscope is a difficult skill to acquire and proficiency deteriorates without regular practice. To help paramedics achieve successful out-of-hospital TI and avoid life-threatening complications, we have instituted use of a video-laryngoscope (VL) by our emergency medical service teams. In this study, we compared instances of VL use with those of a conventional Macintosh laryngoscope (ML) in regard to success rate and esophageal intubation incidence.
**Methods:** This study was approved by our IRB. All ambulances of the Hiroshima City Fire Department have been equipped with a VL (PENTAX-AWS, HOYA) and a specially designed image transmission device that is able to transmit pharyngo-laryngeal images obtained with the VL in real time to medical directors at emergency medical centers in Hiroshima City. For comparisons between VL and ML cases, a chi-square and Fisher's exact test were used, with $P<0.05$ considered to indicate statistical significance.
**Results:** From November 2012 through October 2015, 319 TI procedures were attempted by paramedics for out-of-hospital cardiopulmonary arrest cases. A VL was used in 133 (42%), with the image transmission system also employed in 68 (51%). The overall success rate was 83%, with that of the VL (89%) significantly higher than that of the ML (79%). Two esophageal intubations occurred with use of a VL, which were immediately recognized and successful re-intubation to the trachea was achieved. Meanwhile, there were 21 esophageal intubations with use of an ML, of which 12 were failed re-intubation attempts. The incidences of esophageal intubation and failed intubation due to esophageal intubation with the VL (1.3% and 0%, respectively) were significantly lower than those with the ML (8.2% and 6.5%, respectively).
**Conclusions:** By use of a VL, success rate and esophageal intubation incidence were improved. Furthermore, with a VL and the real-time image transmission system, medical directors are able to give useful instructions to paramedics and verify tube passage through the vocal cords, which is expected to contribute to improve patient care. Accumulation of clinical evidence is needed to determine whether patient outcome is improved.

## 12AP04-4

### Surgeons assign lower pain score to prehospital emergency patients than anaesthetists

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**Background and Goal of Study:** Pain is the main indication for alerting a prehospital doctor staffed emergency service in Germany. Furthermore treatment of pain nowadays is an important marker of quality in health care supply. Previous studies have shown that surgeons and anaesthetists use pain medication at our institution similarly with the exception of opioids, which are significantly more often used by anaesthetists (surgeon vs. anaesthetist OR 0.55). We conducted this retrospective study to see differences in treatment of pain of these specialities compared to pain level of patients.
**Materials and methods:** After IRB approval we conducted this retrospective study of the doctor staffed prehospital emergency service protocols of 2014 in Riem (Munich), which is staffed by surgeons and anaesthetists of our hospital. Statistical calculations were done using Mann-Whitney-U tests with STATA14 (College Station, TX, USA).
**Results and discussion:** We recorded 3024 protocols and excluded 155 incorrect alarms and 122 alarms answered by an internal medicine colleague. Consequently, 2747 protocols were analysed, including 320 ACS (acute coronary syndrome) and 542 trauma emergency calls. Surgeons documented sig-

nificant lower numeric rating scale (NRS) pain scores ($p<0.001$), also in the subcategory acute coronary syndrome ($p=0.002$) but not in trauma (ns) or if opioids were given (ns). No NRS, however, was documented in 33% and 25% of opioid administration by anaesthetists and surgeons, respectively. Although there is a risk of bias because of missing documentation, this data could explain our previous study in which we demonstrated that surgeons administer less opioids: Surgeons rate pain lower in their patients and assign a lower NRS score in general. However, if they administer an opioid the NRS scores did not differ significantly from anaesthetists.

**Conclusions:** Although NRS is a patient based score, surgeons assign lower NRS scores to prehospital emergency service patients compared to anaesthetists. However, documentation compliance was low, even if an opioid was administered; perhaps electronic documentation with mandatory fields for NRS if pain medication is administered might improve documentation and further research.

**Reference:**

Hossfeld, B. et al. Prähospitale Analgesie beim Erwachsenen. Notf.med. up2date 10, 269-284, doi:10.1055/s-0033-1358200 (2015)

## 12AP04-5

### The challenging of airway management in pre-hospital emergency

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**Background and Goal of Study:** Pre-hospital (PH) emergency in our country is performed by a medical team (MT) (nurse and doctor), activated according emergency algorithms.Tracheal intubation (TI), considered the gold standard in airway management (AM), is sometimes required. TI is frequently performed under poor conditions (space, patient positioning, available materials, nobody to call for help). Skilled and trained professionals in AM are crucial to success. Often these professionals are anesthetists.

The aim of our study was to determine which causes need TI in PH critical patients.

**Materials and methods:** Prospective audit (june to november 2015) performed in a pre emergency department of a tertiary hospital. Statistical analysis with Microsoft Excel.

**Results and discussion:** 43 patients were subjected to TI. 65% males, 52% >65 y-old.The main causes of MT activation were cardiopulmonary arrest (CPR) (37.2%) and alteration of level of consciousness (32.6%). Other causes were trauma including cranio encephalic injury(CEI) (11.6%), airway compromise (9.3%), dyspnea (4.7%), syncope (2.3%) and refractory epilepsy (2.3%). On MT arrival, some of these situations had worsened: CPR increased its prevalence to 55.8%, depressed level of consciousness with glasgow coma scale (GCS)<8 found in 27.9% and CEI with GCS<8 found in 9.3%. Respiratory distress in 7% patients. All of them were submitted to TI to improve oxigenation/ventilation or for protection of the airway. 93% of these TI were performed by an anesthesiologist or resident of anesthesia with sucess on fisrt attempt in 81% of cases. 2 attempts were the maximum number registered. No rescue supraglottic devices were required. We didn't find significant complications.

TI remains the gold standard of AM in critical ill patients. Indications to TI are related with problems with airway(A), breathing(B), circulation(C) and disability(D). Problems with C and D were most frequent in our audit. In PH environment conditions for TI are poor which may lead to a higher risk of complications. The great number of anesthetists involved may be an explanation of the low rate of complications found.

**Conclusion(s):** TI in PH environment is associated with higher risk of complications due to poor conditions for AM. Training performers are essential to increase the success in this setting.

**Reference:**

Prehospital endotracheal intubation:elemental or detrimental? Pepe et al. Crit Care (2015) 19:121

## 12AP04-6

### Hemomediastinum resulting from sternal intraosseus infusion in a critical situation

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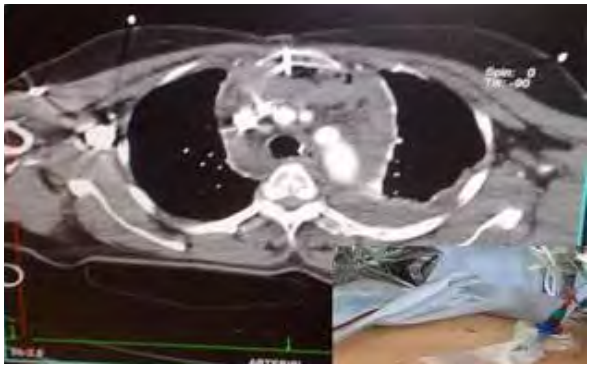
**Background:** Central venous route is needed for resuscitation from shock, but also challenging in some emergency situations. Recently, intraosseous (IO) infusion re-emerged as a recommended alternative to central venous access, for both childs and adults. We report a case of hemomediastinum resulting from sternal intraosseous infusion in a critical situation.

**Case report:** A 72-years-old Afghan woman was admitted at the emergency department of the NATO Kabul International Airport (KAIA) Hospital, Afghanistan. She presented with a hemorrhagic shock due to a traumatic amputation of her right arm by gunshot. The tourniquet placed on the battle field permitted the control of bleeding. She arrived with an infusion of saline on a peripheral venous access. She was quickly sedated and intubated in emergency room. An intraosseus catheter was introduced into the breastbone with a bone injection gun (BIG Wais Medical, Kress USA) device before an intravenous central line was implemented.

Transfusion of four fresh frozen plasma and four red blood cell packs as well as a filling (1L of Voluven and 1.5L of saline) were necessary to stabilize the patient. The subsequent computed tomography scan revealed an hemomediastinum (Figure1)



*[Inserted IO device and CT Scan]*

It was observed the catheter inappropriately crossed both cortices. The packed red blood cells had been instilled directly within the mediastinum. She was admitted in intensive care unit; the catheter was removed and was relieved by an intravenous central line. The recovery was eventful and the patient was discharged on the third postoperative day with spontaneous remission of the hemomediastinum.

**Discussion:** First access for shock and trauma (FAST, Pyng Medical) device, to our knowledge is more suitable with breastbone sternal manubrium insertion point, compare to BIG device (1).

**Reference:**

1. Calkins M et al Intraosseous infusion devices: A comparison for potential use in special operations. Journal of Trauma-Injury Infection and Critical Care 2000; 48 (6):1068-1074.

**Learning points:** This case shows that an intraosseous device inserted in a wrong place associated with some environmental constraints can lead to serious complications.

## 12AP04-8

### Pre-hospital acute coronary syndrome management

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**Background and Goal of Study:** The pre hospital approach to myocardial infarction involves its initial diagnostic suspicion, risk assessment, ECG, transfer to the appropriate hospital center, all while minimizing delays. Pre-hospital approach and diagnosis helps minimizing delays in treatment.
One of our hospital's pre-hospital service's most frequent diagnosis is acute myocardial infarction. Like in many other systems, as a way to bypass normal ER referral and shorten the time between first medical contact and reperfusion therapy, a "coronary fast-track protocol" (CFTP) was implemented.
The goal of this study is to describe and characterize the initial approach and treatment of myocardial infarction patients referred to ER or CFTP.
**Material and methods:** Patients with "acute coronary syndrome" between April 2014 and November 2015 were studied. The patients were divided in two groups, no-CFTP and CFTP, and demographic data, initial triage of the ambulance dispatching service, whether an ECG was performed, initiated treatment (Morphine, Oxygen, Nitrates, Clopidogrel and Acetylsalicylic acid) and Morrow score (age, heart rate and arterial tension) was retrieved.
Results were registered in MS™ Excel® and analyzed in SPPS® statistics software.
**Results and discussion:** A total of 234 patients were studied, 39 in the CFTP group and 195 in the no-CFTP group. Mean age was 69,03 ± 15,03 in the no-CFPT group, and 60,2 ± 11,91 in the CFTP group. Main initial triage symptom was thoracic pain in both the no-CFTP group (79%) and CFTP group (74%). ECG was performed in all the patients in both groups.
Treatment was initiated in both the no-CFTP vs CFTP as follows: Morphine 22% vs 56%; Oxygen 100% vs 100%; Nitrates 35% vs 58%; Clopidogrel 27% vs 82%; AAS 44,6% vs 76,9%.
The CFTP patients appear to be younger and their diagnosis and initial treatment appears to be started earlier than in patients in the no-CFTP group.
**Conclusion(s):** There are differences between patients in both groups, concerning initial approach and treatment. Some hypothesis to explaic these differences can be given, and they can be further assessed.
Optimization of care in cases of acute coronary syndrome can be achieved by better logistics, risk assessment, triage and early initiation of treatment.
**Reference:**
Heart (British Cardiac Society), 98(22), 1674-8.

## 12AP04-9

### Pre-hospital treatment of anaphylaxis: Is adrenaline really given?

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**Background and Goal of Study:** Anaphylaxis is a severe allergic reaction which may include hemodynamic instability and/or respiratory compromise. It can be life-threatening and requires immediate treatment. As stated in the 2015 European Resuscitation Council Guidelines (1), intramuscular (IM) administration of adrenaline is the first line of treatment. Second line includes anti-histaminics, bronchodilators and corticoids. According to a study (2), only 14% of the patients received adrenaline, raising the question: "is adrenaline needed as a first line approach?".
The aim of this study is to verify whether adrenaline is administered as first line in cases of allergy (AA) or anaphylaxis (AN) in the Emergency Medical Service (EMS).
**Material and methods:** Data was retrieved from patients diagnosed with allergy or anaphylaxis in the pre-hospital setting between April 2014 and November 2015. Gender, age, initial triage result, diagnosis, administered treatment and outcome (death in pre-hospital, death in hospital) were registered.
**Results and discussion:** 40 patients (24 with AA and 16 with AN) were identified which accounts for 0,8% of the total number of patients (4892) treated by the EMS in this period. There was a prevalence of female population in the AN group. IM adrenaline was given to 1 patient (4%) of the AA group and 11 (68%) of the AN set. Second line drugs were administered evenly in both sets. More AN patients were transported to the ER (75% vs 29%). No deaths were recorded before or after hospital arrival.
This study shows that pre-hospital dispatch of our medical team to the patient with allergy or anaphylaxis is quite rare (only 0,8%) and even less compared with other studies (though the latter were based on paramedic teams). Adrenaline was given in the majority of the AN patients, following the guidelines, however 32% AN patients were successfully managed without adrenaline.
**Conclusion:** This study shows a significant difference between our data and those reviewed by literature, concerning both sample size and results. IM adrenaline was given in the majority of AN patients and far less in AA patients. Although some patients can be managed without adrenaline, it continues to be the first line option for anaphylaxis patients, as recommended.
**References:**
1. Resuscitation, 95, 148-201.
2. Resuscitation, 81(6), 653-7.

## 12AP04-10

### Effectiveness of a new law to reduce the legal blood alcohol concentration (BAC) limit for driving in Chile

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**Background:** Traffic accidents are one of the most important public health problems in the world and produce social, work and human resources losses. In Chile, a new law introduced in March 2012 has lowered the blood alcohol concentration limit for impaired drivers from 0.1% to 0.08% and the blood alcohol limit for driving under the influence of alcohol from 0.05% to 0.03%, but the effectiveness in reducing traffic accidents remains uncertain. The main goal of this investigation is to evaluate the effects of this enactment on road traffic injuries and fatalities in Chile. This represents the first study on the effectiveness of lowering the legal BAC limits in Chile.
**Methods:** We conducted a preliminary retrospective and prospective review of national databases in Chile from January 2003 until September 2012 to compare the total number of traffic fatalities and injuries and due to alcohol before and after the new road traffic law. We measured monthly rates of traffic injuries and fatalities per 100 000 inhabitants. The data sources included the National Institute of Statistics of Chile, the Ministry of Transport and Telecommunications of Chile (Conaset) and police reports. These databases are available in the public domain. Data were analyzed using SPSS software using a Generalized Linear Models approach, type of Poisson regression, to analyze deaths and injuries.
**Results:** Using SPSS software with the model Month and Period, the odds ratio for deaths after the law relative to deaths before the law was 0.86 and the effect was significant $P<0.000$ (0.86 ± 0.05). Adding a linear trend to the model, Yrs. Lin as a predictor, the rate after the law was only 0.957 ± 0.06 the rate before the law. And that was not significant ($P<0.211$).
**Conclusion:** During the period of January 2012 to September 2012 there was a reduction of 109 deaths in traffic accidents in comparison to the same period in 2011. This figure represents the lowest number of deaths in traffic accidents of the last 16 years. The number of deaths due to alcohol in traffic accidents decreased by 28% during this period compared to 2011. The number of injuries due to alcohol in traffic accidents decreased by 30% during the same period compared to 2011.The information obtained in the present study may help to generate preventive strategies to control deaths and injuries caused by traffic accidents due to alcohol. Our sample size and post-law data was not sufficient to detect significant relevant differences.

## 12AP04-11

### Experimental study: OXSEALIFE

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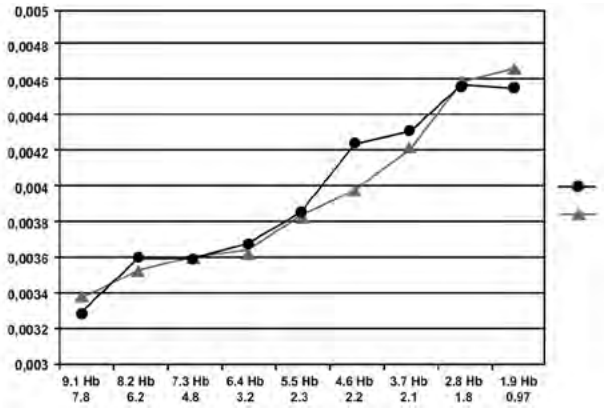
**Introduction:** Oxygen transportation in blood relies mostly on hemoglobin concentration, and the oxygen dissolved in plasma has a relatively minor contribution. Hence, transfusion guidelines generally consider the hemoglobin concentration (alongside with the clinical status of the patient) but not the oxygen partial pressure.
**Purpose:** To demonstrate that coefficient of solubility of oxygen in blood is not static but dynamic. It is generally assumed that the coefficient of solubility of oxygen in plasma is 0.0031 mL O2/mmHg PO2/dl plasma but we hypothesize that this value might change as we do haemodynamic resuscitation following blood loss.
**Method:** We measure dissolved oxygen and solubility coefficient in whole blood and after dilution with plasmalyte (P) and Balanced Hydroxyethylstarch HES 130/0.4 (V). Dilution is performed maintaining a mathematical ratio: 9ml of blood and 1ml of balanced solution, 8ml of blood and 2ml of balanced solution and so on. We measure hemoglobin concentration after each dilution with gasometer. Then we centrifuge each sample and separate plasma from erythrocytes and platelets with a pipette. With an oxygen meter we measure dissolved oxygen in plasma (mg/L) avoiding the presence of bubbles at constant temperature (36ºC) and atmospheric pressure (700mmHg). Estimated pO2 is 147 mmHg (700 mmHg x 0,21) for all dilutions since atmospheric pressure is 700 mmHg and atmospheric PO2 is 0,21. Afterwards we calculate oxygen solubility coefficient by using this formula: *Coefficient of solubility (O2ml/mmHg/dl plasma) = DOplasma/pO2/dl plasma.*

**Results:**




*[Oxsealife results]*

**Discussion:** In face of severe anemia, the contribution made by oxygen dissolved in plasma can be essential to life. Modification of solubility coefficient of oxygen in blood plasma during haemodynamic resuscitation offers ways to augment this contribution.
Now we know that as hemoglobin descends the contribution made by dissolved oxygen increases. These new findings bring us to conclude that arterial oxygen content formula has to be reviewed.
**Conclusions:** Coefficient of solubility is not static but dynamic. More studies are needed.

# Respiration and Airway Management

## 13AP01-1

### Evaluation of a cricothyroidotomy simulator for teaching extreme surgical airway management with and without ultrasound

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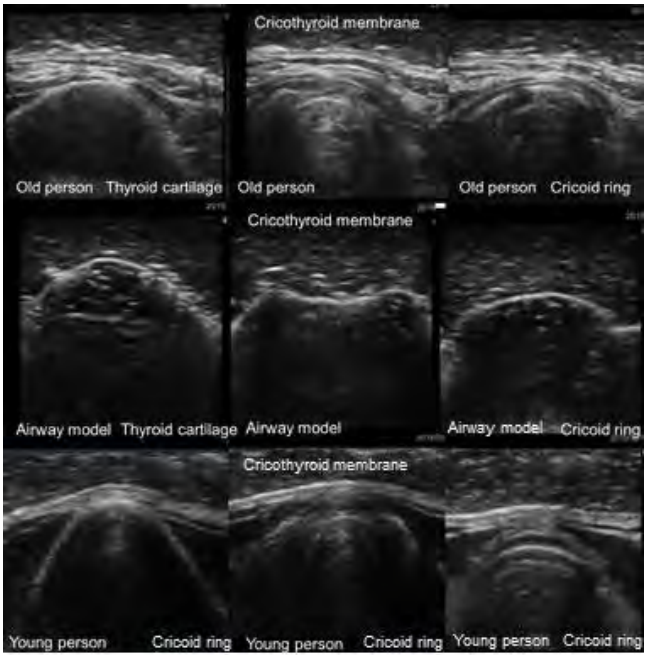
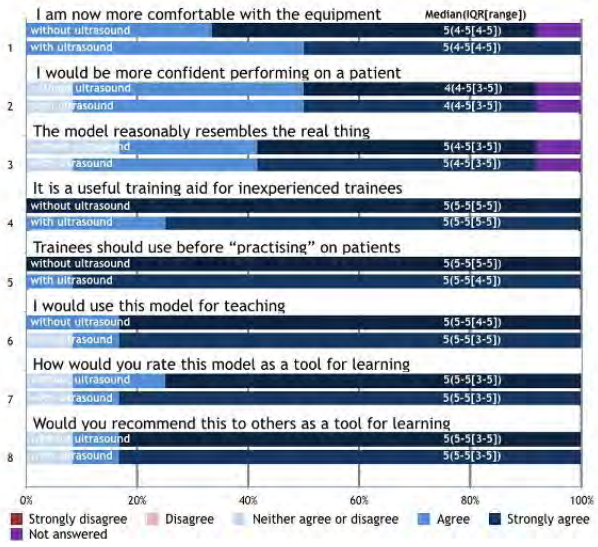
**Background and Goal of Study:** NAP 4 showed that Anaesthetists surgical airway (SA) skills were poor and this was addressed by increased training via simulation. It became apparent that there were no models available in conditions where SA is most urgently needed, conditions like burns, anaphylaxis and angioneurotic oedema, where ultrasound (US) use has been suggested. A cost effective high fidelity model was developed for extreme SA so we decided to evaluate it to see if it could fill the gap in currently available training.[1]
**Materials and methods:** We evaluated a cricothyroidotomy simulator modified to replicate soft tissue neck swelling by adding an ADAMgel (Aqueous Dietary fibre Antifreeze Mix gel) layer, as a training tool using an established questionnaire for validating SA models. 12 anaesthetists with simple SA training (3 consultants, 3 associate specialists, 3 senior and 3 junior trainees) performed surgical cricothyroidotomies without and with US guidance following a sonoanatomy demonstration in normal neck anatomy. (Fig. 1)
**Results and discussion:** 12 participants enrolled in this study and all completed questionnaires for both airway scenarios. The results were universally positive.(Fig. 2) All participants felt this model was particularly useful in training more junior clinicians before they ‚practised' on patients. Most participants reported increased confidence with equipment and performing the procedure on patients and felt it resembled real life.
**Conclusions:** This study demonstrates the utility of this extreme surgical airway model with and without US. It would lead to an increase in confidence and competence despite previous lack of exposure to these difficult and potentially life-threatening situations.
**References:**
1. Willers J, Roberts A, Staniforth M, et al. *BMJ STEL 2015;1:Suppl 2 A28*




*[Figure 1. Collage of sonographs showing anatomical structures in the neck peri-cricothyroid in two age differentiated live subjects (top-old and bottom-young, employing additional ADAMgel to enhance soft-tissue swelling) and the airway model (middle)]*




*[Figure 2. Feedback from evaluating both airway simulation models]*

## 13AP01-2

### Ultrasound-guided percutaneous dilatation tracheostomy: does it have a role in obese patients?

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**Introduction:** Percutaneous tracheostomy (PCT) was first introduced to the ICU since 1957[1]. PCT is now widely practiced in many ICUs. The safety of the technique relies largely on identifying clear anatomical landmarks. These landmarks may be obscure in some patients, more so in the obese ones. Ultrasound use may be of value identifying those landmarks[2]. We will evaluate the success rate of percutaneous tracheostomy using real time ultrasound guidance in morbidly obese patients identified as neck circumference more than 40 cm.
**Methods:** This study is a prospective, randomized comparative clinical trial of 60 patients randomized into Ultrasound guided PCT (PCT group) and Surgical tracheostomy group (Surgical group). In the PCT group two operators performed the procedure, one performed the ultrasound guided PCT and the other visualized the procedure with fiber optic bronchoscope through the oral endotracheal tube. In the Surgical group an Ear-Nose-Throat surgeon performed the surgical tracheostomy procedure with the other operator visualizing the procedure with fiber optic bronchoscope.
**Results:** The procedure in the PCT group was performed in 13.7 min. and in the Surgical group it was performed in 28.33 min. P value = 0.000. No cases of either eosophageal injury or sudden cardiac arrest occurred in both groups. For intra procedure bleeding only one patient (3.3%) showed massive bleeding (defined as blood loss of >50 ml) in the PCT group and 8 patients (26.6%) in the Surgical group, P value = 0.007. The cuff of the endotracheal tube was punctured more in the PCT group (63.3%) than in the Surgical group (23.3%), P value = 0.001. Stomal infection occurred in 16.6% of the patients (5 patients) in PCT group and 36.6% of the patients (11 patients) in the Surgical group. No case of Pneumothorax has occurred in both groups.
**Conclusion:** Ultrasound guided percutaneous tracheostomy can be an alternative to surgical tracheostomy in morbidly obese critically ill patients with neck circumference more than 40 cm..
**References:**
1. Delaney A, Bagshaw SM and Nalos M: Percutaneous dilatational tracheostomy versus surgical tracheostomy in critically ill patients: a systematic review and meta-analysis. *Critical care* 2006;10(2):R55
2. Sustic A, Zupan Z, Antoncic I: Ultrasound-guided percutaneous dilatational tracheostomy with laryngeal mask airway control in a morbidly obese patient. J Clin Anesth 2004;16:121-3.

## 13AP01-3

### "HandyTrak": an innovative percutaneous tracheostomy creating device

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**Background:** Percutaneous tracheostomy has become a frequent procedure within the intensive care environment and various alternatives for tracheostoma creation exist. However, these devices have been associated with both acute and long-term complications, such as: excessive bleeding, posterior wall tracheal perforation, cartilage ring fracture, tracheal stenosis and others. Our hypothesis is that the unique type of dilation system which characterizes "HandyTrak", would create a less traumatic and more regularly shaped stoma, without the necessity to exert excessive pressure on the trachea or to insert devices deeply within the trachea. These advantages may have the potential o reducing the complications previously mentioned.
**Goal:** To evaluate the efficacy of "HandyTrak" in creating a percutaneous stoma opening for tracheo-cannula insertion.
**Materials and methods:** The device was tested on 4 cadavers after receiving authorization. The device consisted of four 10mm long dilator blades which, once inserted through the initial opening performed by a small introducer, would be uniformly opened by a ring-shaped mechanism through the clamping of two handles. This creates a circular shaped stoma, large enough for the passage of available tracheo-cannulas.
**Results:** Eight tests were performed on 4 cadavers with the creation of a total of 8 stomas, all of which were circular in form without any tissue tearing or damage. However, in one test, the stoma was not sufficiently deep enough due to excessive subcutaneous tissue of the neck, making the dilators insufficient in length and not long enough to penetrate the anterior tracheal wall. These finding enabled us make to the necessary modifications, (dilator blades length from 10mm to 15mm) which require validation in further tests.
**Discussion:** The main potential advantages of HandyTrak would be to reduce the following: procedural time, the need to exert downward pressure on the trachea, deep and blind insertion of dilators into the trachea, posterior tracheal wall perforation, bleeding and tearing.
**Conclusion:** HandyTrak has the potential of representing a useful device for percutaneous tracheo-stoma device creation. Further studies performed on cadavers, and ultimately, patients, need to be performed in order verify the safety, time consumption and efficacy of this device before it's introduction into clinical practice.

## 13AP01-4

### High frequency jet ventilation during endolaryngeal surgery: a prospective cohort

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**Background and Goal of Study:** In this prospective observational study, we aim to identify factors associated with intraoperative complications during endolaryngeal surgery (ELS) with infraglottic high frequency jet ventilation (HFJV) under standardized anesthesia regimen and we described our clinical experience with jet ventilation during ELS in 209 patients.
**Materials and methods:** 217 patients who underwent ELS with infraglottic HFJV were investigated. Anaesthesia was induced with midazolam, remifentanil and propofol. Mivacurium was used for neuromuscular blockade. Infraglottic jet ventilation catheter was placed with the aid of a laryngoscope and anesthesia was maintained with propofol and remifentanil infusion under bispectral index guidance. Demographic (age, gender, comorbidities including respiratory and cardiovascular disease) and operative (type of surgery, operation time, previous laryngeal operations) data were noted. Hemodynamics (heart rate, mean arterial pressure), $SpO_2$ and end-tidal $CO_2$ were monitored and were recorded at regular intervals. Complications such as hypoxia, hypercarbia, barotrauma, equipment failure, and requirement for conventional ventilation were also documented.
**Results:** 230 patients undergoing minor laryngotracheal surgery were screened and 217 consenting patients were enrolled. During anaesthetic induction, eight patients were excluded and 209 patients were included in the statistical analysis. Surgery was completed with initial HFJV settings in 190 patients. Additional steps to maintain adequate gas exchange were re-

quired in 15 patients, including orotracheal intubation in four of these patients. Orotracheal intubation was further needed in four patients due to surgical preference. During anaesthesia emergence, laryngeal mask insertion was applied in five patients.
**Discussion:** High frequency jet ventilation via infraglottic catheter is an artificial breathing technique during endolaryngeal interventions that provides adequate oxygenation, an unobstructed view of the surgical field and safe conditions for laser use.[1]
**Conclusion(s):** Jet ventilation with suggested anaesthesia regimen is a good alternative ventilation in endolaryngeal surgery.
**References:**
1. Fritzsche K, Osmers A. Anesthetic management in laryngotracheal surgery. High-frequency jet ventilation as strategy for ventilation during general anesthesia.
Der Anaesthesist, 59 (11) (2010), pp. 1051-1061.

## 13AP01-5

### A novel nasal mask assembly provided CPAP pre-oxygenation, positive pressure ventilation and apnoeic oxygenation during general anaesthesia induction in an obese patient with suspected OSA, difficult airway and poor face-mask fit during Bronchoscopy

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**Background:** Obese patients often present difficulties with face mask ventilation during general anaesthesia (GA) induction. A nasal mask assembly has been shown to maintain oxygenation in sedated obese OSA patients and to improve ventilation in anaesthetized patients with poor face-mask fit.[1-3] We presented its use in an obese patient with a difficult airway.
**Case report:** A 65 y/o obese (BMI 34 kg/m$^2$) female with metastatic lung cancer to the brain, s/p chemotherapy and radiation therapy presented for bronchoscopy to evaluate hemoptysis. CTA revealed a large right hilar mass (8.5 cm) encased pulmonary artery and mainstem bronchus.
She had a full round face, Class III airway, poor dentition, a large tongue and suspected OSA. She gave consent to use a nasal mask for GA induction and for photography/case report. An infant mask (#2) with fully inflated air cushion was secured over her nose with head straps and connected to a breathing circuit with 6 L/min $O_2$ and 1 L/min fresh air flow and 5-6 cm $H_2O$ CPAP delivered through anaesthesia machine. Her $O_2$ saturation (Sat) increased to 100% from 93%. GA was induced with fentanyl and propofol. Her mouth was closed and a tight nose-mask seal was obtained with one hand and positive pressure ventilation was easy with the other hand. Succinylcholine was then given. With the nasal mask assembly providing apneic oxygenation, endotracheal intubation (ETI) was performed using a video-laryngoscope (VL). Her $O_2$ Sat was 100% throughout ETI. Bronchoscopy revealed active arterial bleeding in the right main bronchus requiring urgent endovascular embolization. She was placed in the right lateral decubitus position. Left radial arterial catheter was inserted to monitor blood pressure. She was stabilized and transported to Interventional Radiology Suite for bronchial artery embolization. She tolerated the procedure well without any complications and bleeding was successfully controlled.
**Discussion:** This nasal mask assembly provided continuous oxygenation in an obese patient with a difficult airway and poor face-mask fit during GA induction and VL ETI. It prevented severe desaturation and may have improved patient safety.
**References:**
1. SAMBA 28th AM, March 2013;
2. www.TSEMask.com;
3. ASA AM (MC3009), Oct 2015
**Learning points:** How to provide nasal CPAP preoxygenation in obese OSA patients, assisted nasal ventilation in anaesthetized patients with poor face-mask fit by one anaesthesiologist and continuous apnoeic oxygenation during VL ETI.

## 13AP01-6

### Use of transnasal humidified rapid insufflation ventilator exchange (THRIVE) for rapid sequence induction

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**Background and Goal of Study:** Maintenenace of oxygenation and prevention of desaturation during intubation is the fundamental principle of airway management. This assumes greater importance in emergency situations where the patient physiology might be suboptimal and manual ventilation may not be ideal due to increased risk of regurgitation and aspiration in the presence of a full stomach. Furthermore in the event of a cant intubate cant ventilate scenario, incidence of which is higher in emergency patients, the time pressure might adversely affect the performance of the anaesthetist in securing a definitive airway. Preoxygenation has been the focus of several studies being one of the modifiable factors in increasing the safe apnoeic period under anaesthetic.
**Materials and methods:** We performed a randomized controlled trial to compare preoxygenation using high flow oxygen with Optiflo™ and traditional facemask for patients requiring rapid sequence induction for emergency surgery. Ethics approval was sought and granted for the study. The primary end point was PaO2 post intubation and secondary outcome was time for any desaturations.
**Results and discussion:** The patients were consented and randomly assigned to the THRIVE or Face mask group. 40 patients were recruited. Each patient was pre oxygenated for 3 minutes with THRIVE (70L/min flow) or facemask (12 l/min flow) before induction. After another minute intubation was attempted. After securing the ETT a blood gas sample was obtained and PaO2 levels and time to intubate were documented. The average PaO2 in the THRIVE group was 43.67kPa and 41.88 kPa in the FM group, the difference not statistically significant. The average apnoea time in the THRIVE group was 247.5 sec and 123 sec in the facemask group (p value of <0.001) (figure 1). This was attributed to continued oxygenation possible with THRIVE contributing reducing the stress of an otherwise time pressured situation. The BMI of the patients ranged from 24.5 to 48.
**Conclusion(s):** The results suggest that continuous oxygenation with THRIVE increase the safety margin of airway management in RSI by prolonging the apnoea time. This has significant impact on both training and patient safety aspects as time pressure has been shown to affect decision making and judgment making it less objective and more likely to be influenced by intuition.

## 13AP01-7

### A can't ventilate, can't intubate scenario in a remote location: a rescue approach

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**Background:** The number of procedures in remote locations (RL) has dramatically increased, being an anaesthetic challenge. The most common complications are respiratory events often by oversedation. In RL, a can't ventilate can't intubate (CVCI) scenario is worrisome. We present a case of CVCI in a RL, in which the cricothyrotomy kit (CK) wasn't promptly available. Meanwhile oxygenation was achieved by cannulating a previous tracheostomy scar with a 14G needle attached to oxygen (O2) tube.
**Case report:** A 56 yr-old man, ASA3, with severe obstructive sleep apnoea and a carcinoma of hypopharynx 7yrs before, treated with radiotherapy, was admitted with episodes of food aspiration and severe hypoxemia. He was scheduled for percutaneous endoscopic gastrostomy (PEG) under monitored anaesthesia care(MAC). He had a cervical extension<90º, retraction of submandibular tissues and a scar of a recent cricothyrotomy. After standard ASA monitoring, he was given 40+20mg of propofol. Progressive desaturation below 80% and severe hypotension followed. Attempts at bag-mask ventilation with 2hands, besides the use of an oropharyngeal tube, failed. Ventilation by laryngeal mask was unsuccessful. Grade IV laryngoscopy was achieved with a Macintosh blade. During cervical palpation, it was noticed air passage through a friable hole of about 2mm in the cricothyrotomy scar. The intro-

duction of an intravenous 14G cannula succeeded. Given the absence of jet ventilation(JV) in the room, a 3way stopcock was connected to an O2 tube. Recovery of peripheral O2 saturation was achieved.With Seldinger technique, the cannula was replaced by a CK.The fully awake patient was transferred to postanesthesia care unit, recovering uneventfully.

**Discussion:** Morbidity has been reported in 1-30% of cases with difficult airway (DA), under sedation. This case highlights the importance of knowing the environment available before each procedure. Delineating alternative plans related to a DA is essentia l. In case of CVCI, needle cricothyrotomy+JV or surgical cricothyrotomy are the recommended life-saving treatments.In this case, they weren't available, butoxygenation through a 14G cannula was effective in patient rescue.

**Reference:**

CookT et al.NAP4.2011;NeyrinckA.CurrOpinAnesthesiol.2013;Wijesurya et al.BMJ.2014

**Learning points:** DA management RL challenges the practitioner. Organizational features must be taken into account. A careful evaluation of the airway remains a cornerstone in anesthesia, even providing MAC.

## 13AP01-8

### Free-flow oxygen supply in adults: difference in oxygen flow and oxygen concentration between five different commercially available manual resuscitators

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**Background and Goal of Study:** We compared different resuscitators with regard to oxygen concentration and oxygen flow during both passive and active ventilation, with and without use of the reservoir bag. We tested the variables both at the front and the rear end of the resuscitator.

**Materials and methods:** Four single use brands were tested (VBM, Laerdal, DEAS and Marshall) and compared to the reusable Laerdal resuscitator. Two bags from each brand were selected and three runs each were performed. During testing three different oxygen flows were used : 5, 10 and 15 L/min. The flowmeter (Certifier®FA Flow meter, TSI Minnesota, USA) was located first at the front and then at the rear side of each resuscitator. Data was analyzed with Kruskal Wallis, Friedman or Wilcoxon, as appropriate. Post-test pairwise comparison was performed with Dunn's test.

**Results and discussion:** The time to reach maximum oxygen concentration (max $FiO_2$) was lowest for the disposable Laerdal. The maximum flow at the front was significantly higher in both Laerdal bags (reusable and disposable). The max $FiO_2$ after one minute of manual ventilation with the reservoir bag was lowest with the disposable Laerdal. There were significant differences in max $FiO_2$ with oxygen flows of 5 vs. 15 L/min. Generally, the $FiO_2$ rose with higher oxygen flow.

The max $FiO_2$ and flow at the front and the rear were the same for VBM, DEAS and Marshall, with higher flows at the rear side. The reusable Laerdal showed no significant differences between front and rear. The major advantage of using the rear side is that the max $FiO_2$ was reached within seconds, compared to minutes at the front side. Economically, disposable resuscitators are more interesting than the reusable bag (±€18 vs. €223).The table presents the data with an oxygen flow of 15 L/min.

**Conclusion(s):** Overall, the disposable Laerdal resuscitator provided the best results and seems to be the best option, clinically and economically, for patients breathing spontaneously. For manual ventilation the reusable Laerdal resuscitator remains top choice.

| | VBM | Laerdal | DEAS | Marshall | Laerdal reusable | P-value |
|---|---|---|---|---|---|---|
| Time to max FiO2 front (sec) | 225 [200,280] | 205 [150,260]a | 280 [230,320] | 250 [220,270] | 235 [210,250] | 0.02 |
| Time to max FiO2 rear (sec) | 8[5,9] | 8[5,10] | 9[6,12] | 8[5,18] | 11[7,18] | 0.56 |
| Max flow front (L/min) | 2.59 [2.43,2.77] | 6.92 [5.91,7.96]ab | 1.02 [-0.15,1.46]c | 1.92 [0.89,3.30] | 5.42 [4.20,12.24] | <0.0001 |
| Max flow rear (L/min) | 6.32 [6.16,6.88] | 9.38 [8.75,10.05]c | 9.46 [7.96,11.30]c | 6.04 [3.72,8.60] | 5.92 [4.39,6.58] | 0.001 |
| FiO2 1 min ventilation with reservoir (%) | 96 [87,97]d | 87 [86,88]ac | 95 [88,97] | 93 [91,95] | 96 [93,97] | 0.01 |
| FiO2 1 min ventilation without reservoir (%) | 39 [36,40]bcd | 49 [45,54] | 40 [39,42]c | 49 [45,53] | 52 [48,54] | 0.001 |

a = vs. DEAS, b = vs. Marshall, c = vs. Laerdal reusable, d = vs. Laerdal, e = vs. VBM

*[Table 15L/Min]*

## 13AP01-9

### Assessment of regional lung filling characteristics by electrical impedance tomography and dynamic computed tomography. Experimental study in porcine lavage injury

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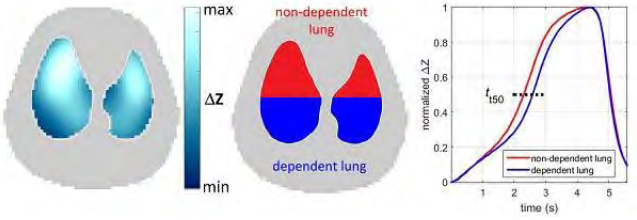
**Background and Goal of Study:** Monitoring lung function during mechanical ventilation at the bedside is of increasing clinical interest. Electrical impedance tomography (EIT) has previously shown its ability to detect changes in ventilation distribution non-invasively. In this context a description of the regional functional lung behaviour during the inspiratory phase would be beneficial. This study investigated regional time delays in EIT in comparison to dynamic computed tomography (dCT).

**Materials and methods:** After animal ethics committee approval, 3 mechanically ventilated pigs (30-40 kg) were studied in healthy (H) and after lung lavage (LAV). The animals were ventilated in pressure controlled mode with an inspiratory pressure ramp of 3 sec at a respiratory rate of 6/min, I:E 1:1, $P_{endinsp}$ to gain a $V_T$ of 10 ml/kg (Elisa 800, Salvia Medical, Germany). Time-synchronized measurements of EIT (Pioneer-Set, Swisstom, Switzerland) and dCT (Emotion 16, Siemens AG, Germany) were recorded at different PEEP levels of 0, 5, 10 and 15 mbar. For each measurement, EIT images were reconstructed in accordance to CT thorax and lung contours (Fig.1A). The times until 50% of the inspiratory peaks ($t_{t50}$) were reached were evaluated by EIT and dCT for non-dependent ($t_{t50V}$) and dependent ($t_{t50D}$) lung regions (Fig.1B)

**Results and discussion:** Consistently, higher $t_{t50}$ values were found in the dependent compared to non-dependent lung, indicating delayed inflation characteristics in the dependent lung regions (Fig.1C). Moreover, mean difference of $t_{t50D}$ and $t_{t50V}$ was significantly lower in H compared to LAV throughout all PEEP levels (0.06 sec and 0.19 sec; $p<0.01$). These results could be reproduced by regional dCT analysis, although with less significance (mean difference of 0.04 sec and 0.1 sec).

**Conclusion:** Our data provides a first validation of the ability of EIT to monitor regional lung dynamics by comparison with the gold standard of dCT.

**Acknowledgements:** This study has been funded by the Vienna Science and Technology Fund (WWTF) through the project LS 14-069.




*[Fig. 1]*

## 13AP01-10

### perioperative management of deventilation syndrome

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**Background:** Deventilation syndrome is a rare complication observed in obstructive sleep apnea (OSA) patients under non-invasive mechanical ventilation (NIV) therapy. Occurrences of dyspnea, muscle weakness and fatigue following the cessation of NIV after waking up in the morning is called deventilation syndrome (1).
**Case report:** A 37 years-old morbidly obese (body mass index 40 kg/m2) male was planned to undergo unilateral adrenaladenectomy. He was under continuous positive airway pressure (CPAP) treatment for OSA for three years and suffered from deventilation syndrome that lasts for 30 minutes every morning. He had snoring and daytime symptoms despite CPAP therapy. In preoperative arterial blood gas samples, PaO2 and PaCO2 values were 84.1 mmHg and 35.4 mmHg respectively. Mask ventilation, intubation period and surgery were uneventful.
The patient was successfully extubated after 120 minutes laparoscopic adrenal adenectomy. In the recovery room, the patient had 2 l/min oxygen support via facemask. He was hemodynamically stable and did not have any airway obstruction, hypoxia or CPAP need in the recovery unit. When his Aldrete score was above nine, PaO2 and PaCO2 values were 97.4 mmHg and 41.7 mmHg respectively, he was discharged to the ward and CPAP therapy was continued during sleep at the night of the operation. He was discharged from the hospital on the 3rd day without any complications.
**Discussion:** All OSA patients should be examined and questioned meticulously before the operation for deventilation syndrome. Patients should be ensured to have NIV therapy before and after the operation. Deventilation syndrome does not bring an additional challenge to the anesthesiologists if the patient is under regular therapy for OSA.
**Reference:**
Esquinas AM, Ucar ZZ, Kirakli C. Deventilation syndrome in severe COPD patients during long-term noninvasive mechanical ventilation: poor sleep pattern, hyperinflation, or silent chronic muscular fatigue? Sleep Breath. 2014 May;18(2):225-6. doi: 10.1007/s11325-013-0931-3

## 13AP01-11

### Prediction of V/Q-Distribution normalisation by changes in end-expiratory lung volume in early ARDS in an animal model

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**Background and Goal of Study:** In acute respiratory distress syndrome (ARDS) a considerably mismatch of ventilation and perfusion ($V_A$/Q) occurs and contributes to the impaired gas exchange. The multiple inert gas elimination technique (MIGET) is the gold standard for $V_A$/Q measurements in experimental settings, though lacks clinical feasibility.[1] Measurement of end-expiratory lung volume (EELV) by nitrogen washin/washout technique is a novel bedside tool that might facilitate lung protective ventilation. We hypothesized that the EELV correlates with $V_A$/Q distribution and that it is possible to predict $V_A$/Q impairment by EELV.
**Materials and methods:** After approval of the state and institutional animal care committee we performed the study according to international guidelines for the care and use of laboratory animals. 12 anaesthetized pigs were randomized to ARDS either by bronchoalveolar lavage or by injection of oleic acid. We measured EELV and $V_A$/Q at healthy state and at five different PEEP steps (0, 20, 15, 10, 5) after induction of ARDS. Each step was kept for 30 minutes before the measurements.
**Results and discussion:** We found a close correlation of $V_A$/Q fractions <0.1 (representing shunt and low $V_A$/Q units) and changes in EELV (spearman correlation coefficient -0.79). Furthermore logistic regression shows that it is possible to predict by EELV measurement, if the amount of $V_A$/Q areas <0.1 is more or less than 5 %. A receiver operating characteristic (ROC) curve revealed an area under the curve of 0.89, which indicates a high sensitivity and specificity for the $V_A$/Q normalisation, if the actual EELV approximates the individual baseline.
**Conclusion(s):** The nitrogen washin/washout is an interesting bedside tool for EELV measurement and even indirect assessment of the $V_A$/Q mismatch in ARDS. It reliably correlates to the extent of $V_A$/Q ratios <0.1. An EELV close to the individual baseline value predicts the normalisation of the $V_A$/Q with a high sensitivity. Therefore it might help to discriminate, if a lung recruitment manoeuvre or higher PEEP improves the $V_A$/Q distribution by opening up atelectatic lung areas or rather overdistends the lung.
**Reference:**
1. Wagner PD. The multiple inert gas elimination technique (MIGET). Intensive Care Med 2008; 34:994-100

## 13AP02-1

### Safety and efficacy of awake intubation with McGrath® videolaryngoscope (VLS) in patients with predicted difficult airways: a case series

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**Background:** VLS have been proposed as alternative to awake fiberoptic intubation (aFOI) in spontaneous breathing patients with expected difficult ventilation/intubation[1]. Aim of this study was to assess safety/efficacy of McGrath® awake intubation in expected difficult airways.
**Material and methods:** 112 ASA I-IV patients with predicted difficult airways (SARI ≥ 4) undergoing general anaesthesia. Exclusion criteria: mouth opening <18 mm, bleeding airways lesions and procedure refusal. After informed consent and monitoring, patients were given oxygen via nasal cannula and premedication (midazolam 0.03 $mg*kg^{-1}$ + atropine 0.01 $mg*kg^{-1}$ and remifentanil 0.05 $mcg*kg^{-1}*min^{-1}$ infusion). Airway topicalization was performed with 10% spray lidocaine on tongue and oropharynx and 2% lidocaine via LMA-MADgic (Teleflex,USA) in hypopharynx. A McGrath® VLS (Aircraft Medical,UK) was then inserted: facing a poor glottic view patient was backupped with aFOI, otherwise a LMA-MADgic precurved as VLS blade was used to spray 2% lidocaine 3+2 ml on vocal cords and trachea (maximal dose $3mg*Kg^{-1}$). 2 minutes later, intubation with McGrath was performed with 90-110° hockeystick styletted tube and confirmed with $EtCO_2$. Age, sex, weight, sedation level (Ramsay Sedation Scale-RSS), time to intubate (TTI, VLS insertion to $EtCO_2$ reading), intubation success/attempts, CL grading, desaturation (<90%), teeth lesions or bleeding were recorded. Subjective difficulty scale (SDS) and patients comfort scale (PCS) on 1-10 visual analogue scale were also measured.
**Results and discussion:** M:F ratio was 62:50; mean weight 77,1±17,05 Kg, mean age 68,8±9,99 (M) and 64,9±10,47 (F). 2 patients were backupped for aFOI and 110 were intubated at first attempt, all cases CL-I. RSS was 1 in all patient, 20% requiring extra propofol to rescue RSS>2 during intubation. No cases of anaesthetic toxicity, desaturation or teeth/airway damage; TTI was 47,09±7,93 sec (no difference for sex or scheduled surgical site/procedure) and in line with 52.0±20.2 sec TTI for aFOI in Liu et Al[2]. SDS was 7,66±1,16 while PCS was 8,44±0,59.
**Conclusion:** in our experience awake intubation with McGrath in expected difficult airways resulted safe, effective, well tolerated and as fast as aFOI, suggesting potential role for VLS in airway algorithms[3].
**References:**
1. Rosenstock CVl. Anesthesiology. 2012; 116(6):1210-6
2. Liu HH. Exp Ther Med. 2015; 9(4):1259-1264
3. Frova G. Minerva Anestesiol. 2010; 76(8):637-40

## 13AP02-2

### S-Guide® versus Gliderite® for videolaryngoscopic intubation of patients with simulated difficult airways

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**Background and Goal of Study:** Non-channeled videolaryngoscopy requires the use of a stylet in order to allow intubation. Studies and clinical practice have shown that Gliderite®, a specifically designed stylet to assist intubation with the Glidescope®, can cause injury. It is the only commercially available stylet for videolaryngoscopy. The S-Guide® is a new flexible multifunction intubating guide. Its hollow lumen allows oxygenation while being malleable and its soft tip is designed to prevent trauma during intubation.We aimed at comparing times, ease of intubation and post-operative status between the two devices using the D-blade® C-Mac® in a prospective randomized study in patients with simulated difficult airways.
**Materials and methods:** 50 patients, ASA physical status 1 to 3, scheduled for elective surgery with oro-tracheal intubation, were included and randomly assigned to the Gliderite (G) or the S-Guide (S) group. Difficult airways were simulated using a neck collar to reduce mouth opening and head movements. Success and number of attempts necessary were recorded, as well as times (expressed as median seconds [25$^{th}$;75$^{th}$]) necessary for glottis identification, blocking of the cuff, ventilation and total procedure. Ventilation was defined as the observation of end-expiratory CO2 curve on capnography, procedure time as the time from touching the C-mac to ventilation.Subjective ease of intubation was assessed on a scale from 1 to 5 and post-operative discomfort (sore throat, hoarseness, dysphagia) evaluated 24h after intubation.
**Results and discussion:** Demographics and anatomical characteristics were identical in both groups and one patient could not be intubated according to study protocol in the G group.
Data on the first 32 patients (15 G, 17 S) showed no difference in times for glottis identification.
Significantly shorter times for cuff blocking (57.3 [47.2-71.5] vs. 38.2 [32.1-44.5], p=0.001), ventilation (76.3 [65.1-84.5] vs. 52 [48-61.2], p=0.001) and intubation times (154.9 [121.3-194.7] vs. 101.7 [96.6-126], p=0.003) were measured for the S-Guide. Operators favoured usage of the S-Guide.
There was no significant difference in post-operative status for any of the variables assessed.
**Conclusion:** Intubation times are significantly shorter using the S-guide compared to the Gliderite®. There is no difference in post-intubation complications.

## 13AP02-3

### The comparison of effect of endotracheal intubation with video laryngoscopy versus direct laryngoscopy on hemodynamics response and stress response

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**Background of Study:** In the study, the effects of *endotracheal intubation* performed with McGRATH video laryngoscopy and direct laryngoscopy under general anesthesia on cardiovascular parameters as well as on cortisol response, one of the stress response effects of *intubation* were evaluated.
**Materials and methods:** The study was conducted with 60 patients who were 18-65 years old and in ASA I-II risk group, who would undergo an operation other than cranial and cardiac surgery in elective conditions. The cases were randomly separated in two groups as Macintosh laryngoscopy (n=30) and McGRATH® series-5 video laryngoscopy (n=30). Intubation was performed after induction when Bispectral index value is 40. Systolic blood pressure (SBP), diastolic blood pressure (DBP), mean blood pressure (MBP), heart rate (HR), blood cortisol levels in terms of stress response were measured 10 minutes before induction and at the 10th, 20th and 30th minutes after intubation.
The patients were evaluated for sore throat, hoarseness, swallowing difficulty and blood swab in the intubation tube at the exit from recovery room and after 24 hours. In the evaluation of sore throat Numeric Rating Scale was used (0-1=no pain; 2-4=mild pain, 5-7= moderate pain, 8-10=severe pain).
**Results:** No difference was observed in the groups with regards to complication. Blood was not determined in the intubation tube of the patients in McGRATH video laryngoscopy group. But blood was determined in the intubation tubes of 11 patients in Macintosh laryngoscopy group and statistical discrepancies were determined between groups. In the evaluation of sore throat, it was higher only at the 24th hour after operation in Macintosh than the other group. SBP, DBP, MBP, HR values of McGRATH group were statistically lower at the 1st and 5th minutes after intubation. The cortisol levels of McGRATH group were lower at the 10th and 20th minutes after intubation. But cortisol levels at the 30th minute were similar.
**Discussion and conclusion:** McGRATH video laryngoscopy provides a better field of view than Macintosh laryngoscopy. Hemodynamics response to intubation is decreased in McGRATH group. Sore throat, swallowing difficulty, blood swab were less in McGRATH video laryngoscopy group. Besides, cortisol response was also determined lower in McGRATH video laryngoscopy group. As a result, we consider that McGRATH video laryngoscopy may be used in the airway management in the patients especially sympathetic discharge is risky.

## 13AP02-4

### Optimization of video laryngoscopy

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**Background and Goal of Study:** Video-laryngoscopy (VL) has enjoyed a rapid increase in popularity and is now considered by many as the first-line technique in airway management. Despite the very good visualization the insertion and advancement of the endotracheal tube may be prolonged and occasionally fail. To optimise C-MAC PM video laryngoscope on laryngeal view and intubation we designed, printed and placed a membrane with “cross hairs” in the screen dimensions 4×5 cm. We hypothesized that targeting the glottic opening in the centre of the cross hairs would improve intubation success rate on first attempt (similar target symbol on monitor screen is designed at PENTAX Airway Scope).
**Materials and methods:** Inexperienced residents with VL performed intubation. Time to intubation served as primary outcome, number of intubation attempts, success rate and subjective evaluation of difficulty served as secondary outcomes. An initial direct laryngoscopy with Macintosh blade laryngoscope was performed, followed by VL with targeting the glottic opening at the centre of the cross hairs.
**Results and discussion:** Improvement in glottic visualisation from Cormack and Lehane (CL) grade III/II to II/I was rated as being clinically relevant. For 88 patients tracheal intubation was successful on 1$^{st}$ attempt while 8 patients needed a second attempt (glottic opening was in the left upper quadrant or in the right lower quadrant). In all patients visualization of the glottis was improved one grade on the rating by CL with C-MAC video laryngosocope (P<0.05). Mean (SD) times for the first attempt laryngoscopy duration were 43 seconds. Intubation success rate of C-MAC at first attempt was 88.9% while in the literature it appears to be between 78-93%.
**Conclusion:** We suggest superposition of a “cross hairs membrane” on the screen of any video laryngoscope with which we can target the glottic opening in the center of the screen or at the top right quadrant. It seems to be a useful technique for improvement of first attempt success rate in the hands of inexperienced residents but also in the potentially difficult airway management.
**Reference:**
Hossfeld B1, Frey K, Doerges V, Lampl L, Helm M. Improvement in glottic visualisation by using the C-MAC PM video laryngoscope as a first-line device for out-of-hospital emergency tracheal intubation: An observational study. Eur J Anaesthesiol. 2015 Jun; 32(6):425-31

## 13AP02-5

### What does classic direct laryngoscopy to temporomandibular joint?

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**Background and Goal of Study:** Classic direct laryngoscopy (CDL) is a risk factor for development of temporomandibular joint (TMJ) disorders. The aim of this study was to evaluate the influence of CDL in mandibular kinematics (MK).
**Materials and methods:** We conducted a prospective observational study during one month. Patients included were older than 18 years old and scheduled for elective surgeries under general anesthesia that require CDL for airway management. Those who didn't cooperate, had TMJ disorders, earache, craniofacial dysmorphisms and had previous head or neck surgery were excluded. TMJ examination was performed 6-72 hours before and after surgery and the following data were registered: maximal voluntary mouth opening (MVO) and maximal assisted opening (MAO), excursive movements of protrusion (P), right laterality (RL) and left laterality (LL), and presence of pain during movements. In postoperative examination anesthetic registration were consulted and the following data were collected: demographic characteristics, body mass index (BMI), airway management, number of the endotracheal tube, intubation attempts and procedure's duration. Descriptive analysis was performed and Student's T test, Mann-Whitney test and Pearson correlation were used. Statistical significance was set at $p<0.05$.
**Results and discussion:** A total of 49 patients were evaluated, 12 were excluded due to incomplete data. Mean age was 54 years (min 18, max 86), 23 patients were female and 14 male. After CDL, there was a significant decrease in MVO values (50.59 vs. 48.95; $p<0.01$), MAO (51.95 vs. 51.05; $p<0.01$), RL (10.05 vs 9.86; $p<0.01$), LL (9.81 vs. 9.51; $p<0.01$) and P (5.68 vs. 4.95; $p<0.01$). No correlation was found between the reduction of MK values and duration of the procedure, number of endotracheal tube, gender and BMI. 5 (13.5%) new cases of TMJ pain were identified, 4 and in MAO and 1 in P movements.
**Conclusion(s):** This study showed a significant reduction of MK values (maximal opening and excursive movements) after CDL. Considering the small dimension of our sample, it would be appropriate to reproduce this study with more patients and with an evaluation of MK at 7 and 14 days postoperatively.

## 13AP02-6

### Comparison of usability between two videolaryngoscopes: a manikin study

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**Background and Goal of Study:** Videolaryngoscopy is emerging as a new standard in the difficult airway management[1]. The impact of the human factor/usability in the performance of the various videolaryngoscopes is not known. We compare the usability of two videolaryngoscopes (VLS) by studying the performance of 20 residents in anaesthesia with no previous experience of videolaryngoscopy intubation using an easy intubation scenario in a manikin[2].
**Materials and methods:** Written informed consent was obtained from first year residents in Anaesthesia of Florence University, without experience about VLS. All participants were familiar with the direct laryngoscopy. The participants were asked to perform endotracheal intubation of the manikin (Laerdal Airway Management Trainer) using two different VLS, without having been previously known their technical use, with a tube size 8 mm. The VLS were the King Vision®
(Ambu Srl) and the AP Advance™ (Venner Medical) both unchanneled. The primary endpoints were intubation time, number of attempts and overall success rate of tracheal intubation for each participant. Failed intubation was defined as trachea not intubated or time of process exceeded 120 s. Statistics: t Student test and Chi Square test when appropriate.
**Results and discussion:** The time needed to perform intubation, was significantly longer with King Vision® respect to APA™: 212± 121 vs 102± 80 sec ($p = 0.027$). We reported 3 failed intubation cases for King Vision® and in 1 for the APA™. After watching the video demonstration, the average time was lower with both devices: 121± 91 sec vs 81±96 sec, but with a difference between the two VLS not statistically significant ($p = 0.309$). Therefore, the difference in the intubation time recorded before and after videos resulted statistically significant for the King Vision® ($p = 0.020$), but not significant using the APA™ ($p = 0.119$).
The training provides a significant advantage only in the case of King Vision®. The explanation must be due to the fact that the APA™ draws in the structure and, consequently, in maneuverability, a traditional laryngoscope while the King Vision® requires a different technique of intubation[3].
**References:**
1. Van Zundert A, et al. Minerva Anestesiol. 2015;81:1159-1162
2. Hodd JA, et al. Anesth Analg. 2011;113:791-800
3. Kaki AM, et al. Saudi J Anaesth 2011;5:3763-81

## 13AP02-8

### King vision laryngoscope facilitates intubation in pregnant women operated for elective caesarian section under general anesthsiology. A prospective randomised simple-blind study

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**Background and Goal of Study:** New technical advances; specially supraglottic devices, have been developed in recent years; aiming to facilitate airway management and therefore patients safety. They are beginning to find now a place in the orotracheal intubation (IOT) in exceptional circumstances. Pregnant women stay always a challenge.
The aim of our study was to compare the intubation with King vision® compared to a reference method: direct laryngoscopy, and to evaluate its performance in terms of facilitation and complications in programmed caesarians under general anesthesiology (AG)
**Materials and methods:** We conducted a prospective randomised single blind study in the obstetric unit of the military hospital of Tunis, including all ASA I and II pregnant women undergoing elective caesarian section under AG. were excluded from our study all women with predictive criteria of difficulty of intubation. Included patients were randomized and divided into two groups: Group "L": including all women whose intubation was decided by direct laryngoscopy with a rigid blade "mackintosh" type and Group "k": including women whose intubation was decided by "King vision" laryngoscope. statistical analysis was carried out by STATVIEW®.
**Results and discussion:** 40 patients were recruited, 20 in each group, they were comparable in demographic parameters and term of pregnancy, caesarian and AG indications. all intubations were successful with both techniques. number of trials was higher in group L (1.5 vs 1.1). fewer time was needed to intubate patients in group K (1.5 minutes vs 1.8minutes). although cormack grading was better in group L (cormack 1 in 40%, 2 in 25% and 3 in 35% of patients of group L vs cormack 2 in 65% and 3 in 35% of group K patients); traction force of the operator was normal in 100% of patients of group K vs 50% normal and 50% high in patients of group L. laryngeal pressure was needed to intubate 10% of the patients of group L, while it wasn't needed in any of the intubation of the group K. hemodynamic features (SAP, DAP, MAP, cardiac rhythm) were higher during the intubation in group L suggesting a higher laryngeal stimulation in this group.
**Conclusion:** king vision provides a better comfort in intubation with less needed time for the procedure and less laryngeal stimulation while intubating pregnant women for caesarians under AG.
**Reference:**
Comparison of the king vision video laryngoscope with the macintosh laryngoscope.Murphy LD.J Emerg Med. 2014 Aug.

## 13AP02-9

### Laryngoscopy grading - a survey of practising anaesthetists

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**Background and Goal of Study:** Visibility of the glottis is often documented by anaesthetists to describe intubating conditions. This documentation forms part of subsequent airway management assessments. The most recent DAS Difficult intubation Guidelines 2015 [1] highlight the need for comprehensive airway management planning to identify potential difficulties and reduce risk of complications during intubation. The Cormack-Lehane laryngoscopic view was first published in 1984 and has become the Gold Standard for airway classification in clinical practise and airway-related research across the world. Cormack-Lehane Grade 3 and 4 view were cited repeatedly in the NAP 4 report [2] to be associated with difficult or failed intubation.
**Materials and methods:** 57 Anaesthetists across all grades of seniority in a large acute NHS Trust were interviewed using a standard questionnaire to establish their understanding of the Cormack-Lehane Classification and its application in modern clinical anaesthetic practise. The questionnaire probed the respondants ability to accurately describe the grades of glottis view at laryngoscopy.
**Results and discussion:** 7% of responants (4/57) had no knowledge of a classification for direct laryngoscopic view. Of the 93% who claimed to be aware of such a classification tool, 15% incorrectly cited the Mallampati airway assessment tool as an example.Only 73% (38/53) of practising anaesthetists correctly identified the C-L classification tool.After prompting, a total of 52 anaesthetists stated that they knew the C-L tool. Of these over 80% could describe the Grade 1 view, whereas less than two-thirds could describe any of the other 3 Grades with any degree of accuracy. Over all less than 50% of those questioned could describe all 4 grades accurately.
**Conclusion(s):** Accurate documentation of glottic view at direct laryngoscopy is important and should be a universal standard on all anaesthetic charts. The Cormack-Lehane classification is a simple reproducible 4 grade description in widespread clinical use. It contributes to the comprehensive airway assessment and planning for future anaesthetic episodes in all patients. Education packages for all staff should help to improve compliance.
**References:**
1. British Journal of Anaesthesia, 2015, 1-22
2. British Journal of Anaesthesia. 2011, 617-631

## 13AP02-10

### King Vision video laryngoscope for intubation of patients with difficult airway characteristics

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**Background and Goal of Study:** The King Vision video-laryngoscope has been introduced in the last decade to help overcome some of the challenges associated with difficult intubation; it appears to provide better glottic visualization than direct laryngoscopy and it translates into improved management of anticipated difficult intubation.
**Materials and methods:** We studied 128 patients who were assessed prior to general anesthesia with several clinical criteria included into el-Ganzouri risk index: mouth opening, thyromental distance, Mallampati classification, neck movement, ability to prognath, body weight and history of difficult tracheal intubation. In patients with difficult airway characteristics (el-Ganzouri score ≥4) we used, as first device, the king Vision video laryngoscope. After the surgical operation we completed the postoperative sheet including, time for intubation and intubation difficult scale, which is a function of seven parameters (number of supplementary attempts, number of supplementary operators, number of alternative techniques used, glottic exposure as defined by the Cormack grade, lifting force applied during laryngoscopy, necessity of applied external laryngeal pressure, position of vocal cords), resulting in a progressive, quantitative determination of intubation complexity.
**Results:** We identified 20 (15.62%) cases of anticipated difficult intubation (el-Ganzouri score ≥4) and 6 (4.68%) cases of unanticipated difficult intubation (IDS ≥ 4). Using the King Vision video laryngoscope in the 20 cases of anticipated difficult intubation we obtained 18 (90%) cases with IDS ≤ 3, 1 case with IDS=5 and 1case with IDS= 6. Any early postoperative complications were recorded.
**Conclusion:** Accurate preoperative prediction of potential difficulty with intubation is really important to reduce the incidence of complications just taking additional precautions before beginning anesthesia. The video laryngoscopy results in a significantly better view of the cords, a higher success rate, faster intubation and less need for optimizing maneuvers when compared to direct laryngoscopy.
In patients with predicted difficult airways the King Vision video laryngoscope is recommended as the primary intubating device.

## 13AP03-1

### High bodyweight and without gel are predictors of first insertion failure of laryngeal mask airway

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**Background and Goal of Study:** Laryngeal mask airway (LMA) is a very popular airway for its high maneuverable and tolerable. Re-insertion of LMA could increase the risk of laryngospasm, hypoxemia and postoperative sore throat. The aim of the present study is to investigate the predictor of first insertion failure of laryngeal mask airway.
**Materials and methods:** 488 patients undergoing general anesthesia with LMA, age 18-75, American society of anesthesia (ASA) physical status I to III were involved in our study. LMA was inserted after induction. High peak pressure of ventilation and leakage air were indicators of LMA re-insertion.
**Results and discussion:** First insertion failure rate was 5.1% (n=25). Based on the univariate analysis, patient with high bodyweight (75.21±14.00 vs. 66.69±14.53, *p=0.007*) and insertion without gel (28.0% vs. 8.9%, *p=0.015*) were related to first insertion failure. No relationship between gender, age, ASA status, experience of operator and first insertion failure rate could be found in our study. Multiplevariete analysis also showed high bodyweight (OR 1.043, 1.011-1.075) and without gel
(OR 3.986, 1.438-11.050) was independent predictors of first insertion failure.
**Conclusion(s):** High bodyweight significantly increase the risk of first insertion failure of LMA. Prepare for re-insertion or intubation when patient is obesity. Lubricate the LMA before insertion should also be emphasized in the operation guideline.

## 13AP03-2

### Comparison of Ambu AuraGain *vs* LMA Supreme in patients undergoing gynaecologic laparoscopy

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**Background:** The use of Second generation supraglottic devices for gynaecologic laparoscopy has been reported to be effective and safe. To provide optimal ventilation, the oropharyngeal seal pressure should exceed the peak airway pressure during pneumoperitoneum in the Trendelenburg position. The aim of this study was to compare the airway seal pressure of the Ambu AuraGain™ versus the LMA Supreme™.
**Methods:** Sixty female patients were randomly allocated to be ventilated with either the AuraGain or the Supreme. A target-controlled system was used to administer total intravenous anaesthesia. All insertions were done by experienced anaesthetists. Cuff inflation pressure was maintained at 60cm$H_2O$. The following parameters were evaluated: ease of insertion (time and manoeuvres required), airway seal pressure and peak airway pressure at four time points (after insertion, after pneumoperitoneum, during Trendelenburg position and at the end of surgery); ease of gastric tube passage; endoscopic view of the glottis; presence of blood at withdrawal of the device and oropharyngeal morbidity.
**Results:** Adequate ventilation was achieved in all patients at first attempt, except in one case in the Supreme group, that required reinsertion. No difference was found between the AuraGain and the Supreme in overall time needed (13±5 vs 11±5 s; p=0.17), or the number of patients requiring manoeuvres for insertion (21 vs 16; p=0.46). Mean increase in peak airway pressure during the Trendelenburg position was 8.6±3cmH2O in both groups (15±3 to 25±4cm$H_2O$; p<0,01). The AuraGain achieved higher seal pressures at this time point (36±5 vs 30±5cm$H_2O$; p<0,01). Three patients in the Supreme group required ventilator adjustments to avoid gas leaks. Gastric tube pas-

sage was easy in all patients. Endoscopic view of vocal cords was possible in all patients. The epiglottis was inside the tube in most patients (68% and 62%). The incidence of blood staining
(6% vs 10%) and oropharyngeal symptoms (13% vs 6%) was low and similar with the Auragain and the Supreme respectively.
**Conclusion:** Both devices provided effective ventilation for gynaecologic laparoscopy with low rates of complications. The Ambu AuraGain achieved higher seal pressures allowing wider margin for ventilation during pneumoperitoneum in Trendelenburg position. The Endoscopic views suggest that guided tracheal intubation through the AuraGain would be easy if needed. However, blind passage of the tracheal tube cannot be recommended.

## 13AP03-3

### I-Gel as a suitable alternative to endotracheal tubes in the laparoscopic pneumoperitoneum and Trendelenburg position

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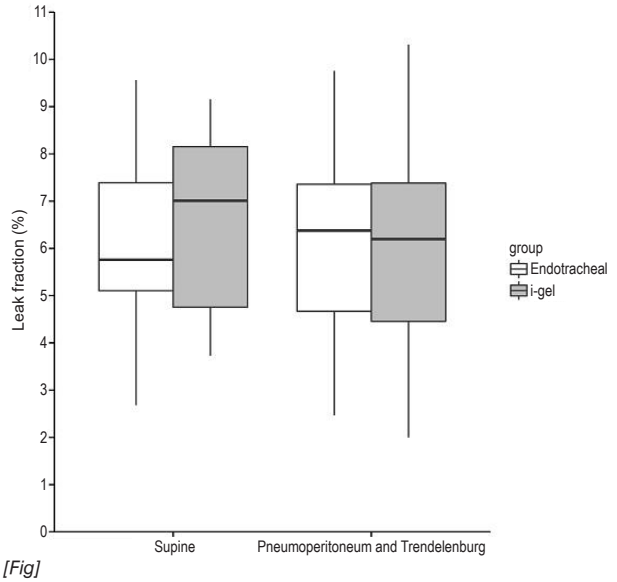
**Background and Goal of Study:** The i-gel (Intersurgical Ltd) is a second-generation supraglottic airway devices. In this prospective and randomized study, we investigated the comprehensive respiratory measurement between the uses of i-gel and an endotracheal tube (ETT) in the laparoscopic pneumoperitoneum and Trendelenburg position.
**Materials and methods:** Forty paralyzed patients (age,20-80y) with American Society of Anaesthesiology Classification I-II Status recruited assigned to an i-gel or ETT group , with 20 patients in each group. After standard anaesthetisation, the ventilator was setting to 8 mL/kg by using volume control ventilation. The respiratory parameters were collected in the supine and laparoscopic (insufflation 12 mmHg) as well as Trendelenburg(25◦) position. The primary outcome was the leak fraction, which was compared between the i-gel and ETT groups.
**Results and discussion:** No significant difference was observed in the leak fraction between the i-gel and ETT groups in the supine and laparoscopic pneumoperitoneum and Trendelenburg position (fig).




*[Fig]*

Within the i-gel group, less leakage was observed in the laparoscopic pneumoperitoneum and Trendelenburg position than in the supine position (fig). However, within the ETT group, no decreasing trend was observed in the leak fraction in the laparoscopic pneumoperitoneum and Trendelenburg position compared with the supine position(fig). The reasons were the unique design of the i-gel and more enhanced seal between the i-gel and peripharyngeal area in the laparoscopic pneumoperitoneum and Trendelenburg position than in the supine position.
**Conclusion(s):** The performance of the i-gel in the laparoscopic pneumoperitoneum and Trendelenburg position was comparable to that of the ETT. Notably, using i-gel reduced gas-leakage in the laparoscopic pneumoperitoneum and Trendelenburg position more than it did in the supine position.

## 13AP03-4

### Supraglottic airway devices versus the endotracheal tube in Trendelenburg position during gynecological laparoscopy: a prospective study

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**Background and Goal of Study:** The supraglottic airway devices (SADs) (such as LMA, i-gel) have become widely popular for different types surgical procedures. They provide a less invasive airway as compared to the endotracheal tube. The use of SADs during elective gynecological laparoscopy is still not widely accepted due to the controversies about possibility of complications of regurgitation.
**Materials and methods:** We conducted a prospective study of 125 patients of ASA grade I-II. All operations are performed under general anesthesia (propofol + fentanyl + rocuronium). Patients were randomly assigned to the 3 groups, I group (n=47) having endotracheal intubation with cuffed Endotracheal Tube (ETT), in the II group (LMA) (n=40), LMA-supreme was inserted and in the III group(n=38) (IGEL) i-gel was inserted.
All patients underwent elective gynecological laparoscopic procedures. The average duration of surgery was 82 ± 32,4 minutes in all the groups. The head down tilt was between 20º-25º. We observed the hemodynamic changes, peak pulmonary pressure, airway resistance at the time of induction and at 5, 15, 30 and 60 minutes after gas insufflation and at the time of extubation. We compared the total amount of opioid, anesthetic and muscle relaxant between the groups.
Controlling the depth of anesthesia was performed by using a BIS-monitor, depth of neuromuscular blockade was determined using TOF-monitor. We examined pH of oropharyngeal cavity by insertion a pH test strips before insertion and after removal of the SADs and ETT. In the early postoperative period a comparative evaluation between the groups in the frequency of PONV and sore throat was performed
**Results and discussion:** Between the two groups showed no significant differences in the consumption of anesthetic, an opioid and a muscle relaxant. We revealed the pH to be between 6,5-7,5 in all three groups at both stages, which indirectly indicates the absence of regurgitation of acid stomach content into the oral cavity. PONV was not observed in either group. The frequency of sore throat was 52±12.7% in the ETT and Group LMA and Igel 10.5±4.3 and 11.4±4.7% respectively.
**Conclusion(s):** We conclude that the using supraglottic oropharyngeal airway devices provide a sufficient level of safety during gynecological laparoscopic operations in the Trendelenburg position and improve the comfort of the patient in the postoperative period.

## 13AP03-5

### Comparison of laryngeal mask supreme and endotracheal intubation without neuromuscular blockers in laparoscopic gynecological surgery

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**Background and Goal of Study:** New generation supraglottic airway devices (SGAD) are being used in a variety of laparoscopic surgeries. Our aim was to compare the effects on surgical view and ventilation parameters of laryngeal mask airway-supreme (LM-S) and endotracheal tube (ETT) applications,in cases undergoing laparoscopic gynecological surgery without using a neuromuscular blocker agent (NBA) in the Trendelenburg position with positive pressure ventilation.
**Materials and methods:** After IRB approval and after written informed consent in this study was prospective, randomized and double blind, including 100 patients in ASA I-II class between 18 and 65 years old. Patients were divided into two groups;Group ETT (n=50) and Group LM-S (n=50). Standard anesthesia and ventilation protocols were administered to patients in all groups. Ventilation parameters were recorded in the peroperative period 2 minutes after airway device insertion (T1), after peritoneal insufflation and Trendelenburg position (T2), before desufflation (T3) and after removal of the airway device (T4) and laryngopharyngeal morbidity was recorded in the

postoperative period. The surgeon, blind to the study, was asked to score pneumoperitoneum sufficiency (sufficient/insufficient), abdominal distension and surgical view (1-poor to 4-excellent).
**Results and discussion:** The insertion time in Group LM-S (13.86±2.88 s) was significantly shorter than the time in Group ETT (21.62±9.0 s).In Group LM-S the oropharyngeal leak pressure (OLP) was 25.60±4.93 cm$H_2O$. The OLP values in Group LM-S did not show significant change when measured during the peroperative period. Ppeak in Group ETT at T1 was found to be high compared to Group LM-S. Ppeak and Pmean at T4 were found to be high in Group ETT. In terms of the number of Veress needle entries, sufficiency of pneumoperitoneum and surgical view quality, there was no significant differences found between the groups. At 1 hour postoperative laryngopharyngeal morbidity was found to be higher in Group ETT.
**Conclusion:** The results of this study showed that gynecological laparoscopies can be performed without using NBA without limitation the surgeon's hand movements while maintaining a good surgical view.This study concludes that in special situations where NBA use should be avoided,like muscle diseases, myopathies and neurological disease, SGAD's can be reliably used in anesthetic management.

## 13AP03-6

### Evaluation of the Baska laryngeal mask during general anesthesia with positive pressure ventilation

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**Background:** The Baska laryngeal mask (BKM) is a novel supraglottic airway device. It has a valveless, self-inflating cuff, which increases the seal with the inspiratory flow, and a double suction system (third generation).
**Goal of study:** To determine effectiveness of the BKM for a primary control of the airway during positive pressure ventilation (PPV).
**Materials and methods:** BMK was used in 60 consecutive patients programmed for elective surgery. Specific informed consent was requested. After 3 minutes of 100% oxygen administration (denitrogenation), induction anesthesia was performed. The airway device was inserted according the manufacturer's instructions. Two attempts maximum. If failure, the patient was intubated. Effectiveness in PPV when a tidal volumen of 6 ml/kg was garantized. Position was verified with flexible videoendoscope (FIVE of KarlStorz, Germany). Number of attempts, time and leak pressure, hemodynamic and ventilatory data were measured. The presence of blood stains on the mask, and 24h after surgery complications were checked.
**Results:** In 98,4% of the patients the BASKA mask has proven to be effective in mechanical ventilation (Table 1). Insertion was achieved in a first and second attempt in 53 (88%) and 6 (10%) of the patients, respectively. In 26 patients (43,3%) adjusting manoeuvres were needed. In one single patient ventilation was ineffective, later diagnosed with lingual hypertrophy. In 6 (10%) patients, airway trauma was found. In 4 (6,6%) minor complications were reported (sore throat), recovering in 24h without treatment.
Sealing pressure was >40 cmH2O in 6 patients. Nasogastric tube passed through on the first attempt in 98,4%. The glotis was visualized in all cases. In 36 (61%) more than 75% was observed, in the following 23 patients (38,9%) more than 50% of the glotis was viewed.
Friedman test was used for statistic analysis.
**Conclusion:** MBK mask is efficient in airway control in PPV. As advantages it has the ease of insertion (94% on first attempt), short time (18,4±4sec) and superior seal pressure. Furthermore, progressive cuff inflation limits possible injury risk in the airway.

| Inspiratory TV | 500,9±63,0ml |
|---|---|
| PEEP | 3,1±0,4 cmH20 |
| Peak pressure | 19,5±4,3 cmH20 |
| Mean pressure | 8,3±2,3 cmH20 |
| O2Sat% | 99,5±0,8% |
| Seal pressure | 30,1±3,6 cmH20 |
| ETCO2 | 34,1±3,7 mmHg |

*[Table 1. Ventilatory data]*

## 13AP03-7

### A randomized comparison of laryngeal mask airway Classic™ with the self-pressurised air-Q™ intubating laryngeal airway in adults

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**Background and Goal of Study:** The self-pressurising air-Q® Intubating Laryngeal Airway (air-Q SP, Mercury Medical, Clearwater, FL,USA) is a new supraglottic airway device (SAD). The intracuff pressure of air-Q SP dynamically equilibrates with the airway pressure and adjusts the patient's pharyngeal and periglottic anatomy so that we can anticipate the improved clinical efficacy. The aim of this prospective, randomized and comparative study is to compare the clinical performance of air-Q SP with the performance of the laryngeal mask airway Classic™ (LMA classic) in adult patients undergoing general anesthesia.
**Materials and methods:** Eighty four patients aged 20-75 who were undergoing general anesthesia for elective surgery were enrolled and randomly assigned to either air-Q SP group or the LMA classic group. Success rate, insertion features, sealing function, oropharyngeal leak pressure, gastric insufflation, fiberoptic grade and complications were assessed and compared between the two groups.
**Results and discussion:** Insertion time of air-Q SP was regarded as significant faster compared to LMA classic group (18.0 ± 6.4 sec vs 26.9 ± 10.2 sec, $p < 0.001$). There were also statistically significant differences in the fiberoptic grades of view between the air-Q SP group and LMA classic group at initial and 10minutes after initial assessment, respectively ($p < 0.001$, $p < 0.001$). There were no statistical differences between the groups in successful insertion at first attempt, overall insertion success, oropharyngeal leak pressures and postoperative pharyngolaryngeal complications.
**Conclusion(s):** The air-Q SP had faster insertion time and superior fiberoptic grades of view when compared with the LMA classic. Air-Q SP may be a great conduit for tracheal intubation and a suitable alternative to the LMA classic in adult patients.
**References:**
Jagannathan N, Sohn LE, Sawardekar A, Shah R, Ryan K, Jagannathan R, et al. A randomised comparison of the self-pressurised air-QTM intubating laryngeal airway with the LMA Unique in children. Anaesthesia 2012; 67: 973-9.
Galgon RE, Schroeder K, Joffe AM. The self-pressurising air-Q(R) Intubating Laryngeal Airway for airway maintenance during anaesthesia in adults: a report of the first 100 uses. Anaesth Intensive Care 2012; 40: 1023-7.

## 13AP03-8

### The method of gender selection mask size of the intubating laryngeal mask airway for overweight and obese patients

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**Background and Goal of Study:** We tested the hypothesis that the gender selection of ILMA size is efficient for ventilation and blind TI for patients with overweight and obese with predictive signs of difficult airway or after TI failure.
**Materials and methods:** The prospective study of 156 adults undergoing of the general anesthesia I-IV classes ASA (100 males and 56 females) with increased body mass index (BMI) 25-30 kg $m^{-2}$ and obesity (BMI>30), in whom ILMA Fastrach™ was used electively or emergently at three clinical institutions from Oct 2007 to Oct 2015. Size selection was based on gender principle: ILM №5 for male and ILM №4 for female. Estimated parameters: ventilation by a facemask, success of insertion ILMA, quality of ventilation (ILMA-V) and time for insertion/removal of ILMA and ETT (ILMA-IT). 20/156 patients allocated randomly and regurgitation was assessed by pH strips before insertion and after removal of ILMA.

**Results and discussion:** 110 patients had predictive (4 or more) signs of difficult TI (PDTI); in 46 patients with unpredicted difficult TI and ILMA was inserted after 2 attempts intubation failure (UDTI). 93/156 (59.6%) had 5 or more signs of PDTI. 58/156 patients were morbidly obese with BMI>40 kg $m^{-2}$; 13/58 - BMI>45, 10/58 - BMI>55. The ventilation by a facemask and ILMA was successfully inserted at the first attempt within 8.2±2.9 s after induction/ventilation in 100%.The blind TI through ILM (ETT № 7.5 or 8) was successful in 147/156 (94%) of cases, and in 91% at first attempt. Total TI time was 7.5±4.8 s with, on ILMA removal - 9.2±1.5 s. 5 blind attempts of TI through ILM wasn't possible; ILMA was removed and replaced by LMA Proseal or Supreme followed TI with direct laryngoscopy. 46/156 patients had only 2-3 DTI predictors, but TI with direct laryngoscopy was unsuccessful. In this patients TI through ILMA was made at the first attempt 40/46 (87%) patients; 6 patients (13%) required adjusting manoeuvre for successful ILMA-TI. In 1 case was situation "can't intubate-can't oxygenate", ILMA provided ventilation/blind TI at the first attempt. Signs of regurgitation by pH (6.0) strips weren't registered.
**Conclusion(s):** The ILMA is an easy-to-use airway device with a high success rate of insertion and requires little training time for ILMA-V and ILMA-TI. The choice of ILMA size, based on the gender principle, has been efficient for ventilation and TI of obese patients with predictive signs of difficult airway or after intubation failure.

## 13AP03-9

### Evaluation of the LMA Protector in 26 non-paralysed patients: case series

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**Background and Goal of Study:** We studied the new LMA Protector in 26 elective non-paralysed patients who underwent minor gynaecological procedures using the size 3 airway. This new disposable silicone airway device provides access and functional separation of the respiratory and digestive tracts. The airway tube is elliptical in cross section ending at the laryngeal opening. The device contains 2 drainage channels (male and female port) proximally that continues into a common distal opening posterior to the distal airway cuff bowl. The female port allows a gastric tube to be passed into the stomach, whilst a suction tube may be attached to the male suction port offering removal of gastric fluid around the upper oesophagus sphincter.
**Materials and methods:** We assessed the ease of use, airway quality, device positioning, airway leak and complications associated with use.
**Results and discussion:** Insertion was successful on first and second attempts in 23 (88.5%) and 3 (11.5%) respectively. Median [IQR (range)] insertion time was 19 [17-21(14-58)] seconds. Airway leak pressure was 25.5 [23-29(21-30] cmH2O. On fibreoptic examination via the device, vocal cords were visible in all 26 patients. There were no alternative airway use or airway manipulations required during maintenance of anaesthesia. Six patients had minor sore throat 24 hours after procedures and there was no dysphagia or hoarseness.
**Conclusion(s):** This pilot study of the LMA protector shows that the device is easily inserted with fast insertion time, providing a reliable and adequate airway seal. Further studies would be required to assess and compare LMA Protector to other supraglottic airways devices.
**Reference:**
Cook TM, Gatward JJ, Handel J, Hardy R, Thompson C, Srivastava R, et al. Evaluation of the LMA Supreme in 100 non-paralysed patients. Anaesthesia. 2009 May;64(5):555-62.
**Acknowledgements:** This clinical trial received research funding and LMA Protector size 3 airways from Teleflex Medical Asia Private Limited.

## 13AP03-10

### Totaltrack: insertion time and desaturation. Is there a relationship? A case series

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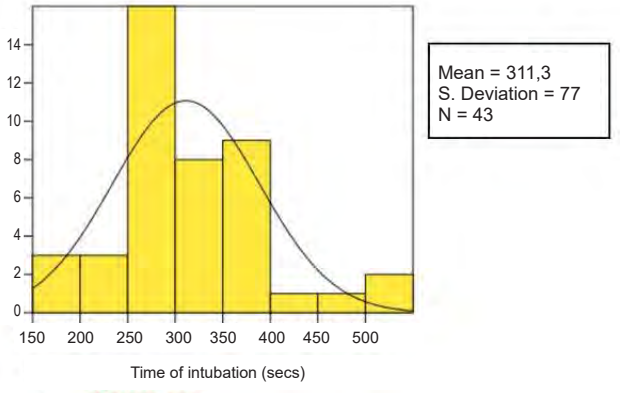
**Backgroud and goal of study:** Difficult airway management is one of the main challenges anesthesiologist must face. Several airway devices can be used such as video laryngoscopes or flexible fibroscope. Totaltrack® is a new device with the possibility of direct vision intubation while we are ventilating the patient at all times, so we can minimize the risk of desaturation of the patient.
**Materials and methods:** This case series includes 43 patients undergoing elective surgery under general anesthesia. Standard monitorization was performed. All the patients were preoxygenated with 100% oxygen for 3 minutes. General anesthesia was induced with: propofol 2mg/Kg, Fentanyl 2mcg/Kg, dexamethasone 0.1mg/Kg. Rocuronium was used as neuromuscular blocker at a dose of 0.6mg/Kg not util the vocal cords were seen with the videolaringoscope. All 43 patients were intubated by experienced anesthesiologists with a Totaltrack® device. Measured variables were successful intubation, time of insertion, and desaturation (measured by minimum SpO2 detected in pulsioxymetry).
All data were analyzed using IBM SPSS Statistics 20.0 software.
**Results and discussion:** All 43 patients were succesfully intubated without incidences. There was no lip, dental or laryngeal trauma. Mean time for intubation was 311,2 (SD=77,46) (see figure). The relationship between minimum SPO2 and the time of insertion was not significant. And minimum desaturation observed in all patients was 95% in one of the cases. All this data may probably be due to the possibility of being ventilating during all the process of intubation. That possibility, increases the security of the airway management, because no clinically important desaturations are observed and we use the neuromuscular blocker when a successful intubation is posible (by the visualization of the vocal cords).




*[Time of intubation]*

**Conclusions:** Secure airway management is essential. The combination of intubating and ventilating at the same time is one step forward towards this security. No desaturation was observed in none of the patients of this series, with a mean time of insertion and intubation of 311 seconds.

## 13AP03-11

### Evaluation of the pH of secretions in the hypopharynx during gynaecological laparoscopy. Is the use of a laryngeal mask airway safe?

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**Background and Goal of Study:** We evaluated the safety of using a ProSeal laryngeal mask airway during gynaecological laparoscopy, assessing the risk of regurgitation of gastric contentes by measuring the pH of secretions in the hypopharynx during the anaesthetic/surgical procedure.
**Materials and methods:** In total, 80 patients were evaluated who were under general anaesthesia for gynaecological laparoscopy in which airway access was maintained using a ProSeal laryngeal mask airway. Secretions in the hypopharynx were collected by aspiration using an oesophageal drainage tube to measure their pH at various times during the anaesthetic/surgical procedure. We used pH test strips, pH 2-9 (Merck, Darmstadt, Germany), and in case of any doubts, a pH meter was also used. A pH of ≤ 4.0 was considered positive for the regurgitation of gastric contents.
**Results and discussion:** None of the pH measurements of analysed secretions in the hypopharynx had a pH of ≤ 4.0. The mean pH of the secretions varied from 6.34 for the lower means to 6.50 for the higher means when measured at different time points, which are comparable to the normal pH of saliva.
**Conclusion(s):** From these results, we conclude that the ProSeal laryngeal mask airway is a safe alternative for anaesthesia during laparoscopic surgery for patients without risk factors for the regurgitation of gastric contents.
**References:**
1. Brain AIJ, Verghese C, Strube RJ. The LMA 'ProSeal' - a laryngeal mask with an oesophageal vent. Br J Anaesth 2005; 49: 275-80.
2. Cook TM, Lee G, Nolan JP.The ProsealTM laryngeal mask airway: a review of the literature. Can J Anaesth 2005; 52: 739-60.
3. Ambi U, Koppal R, Joshi C, Prakashappa DS, Iyer H. LMA Classic and LMA Proseal: a comparative study in paralyzed anaesthetized patients. J Clin Diagn Res 2011; 5: 940-3.

## 13AP03-12

### Incidence of difficult intubation in patients undergoing thyroid gland reoperation due to bleeding or haematoma

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**Background and Goal of Study:** Emergency reoperation of thyroid gland due to bleeding and haematoma is a life threatening situation for patient which poses several problems for anaesthesiologist. One of them is the difficulty in air management due to compression of trachea by haematoma which may result in reduction of tracheal lumen or tracheal dislocation, presence of blood in airway, significant oedema of epiglottis, pharyngeal wall and the vocal cords. The aim of this study was to determine the incidence of difficult intubation in patients undergoing thyroid gland reoperation due to bleeding or haematoma in our center.
**Materials and methods:** We conducted a retrospective study at the National cancer research center of Serbia from January 1st, 2014 to June 31st 2015. Data were obtained from medical records and patient histories. All patients who had a thyroid gland reoperation due to bleeding or haematoma during this period were included. Difficult laryngoscopy was defined according to Cormack and Lehane grade III and IV classification while difficult intubation according to ASA criteria. Data were analyzed using methods of descriptive statistics.
**Results and discussion:** Thyroid gland operation in our center was performed in 1253 patients in the study period. Among them, 19 patients (73,4 % women, median age 56 years) had a reoperation due to bleeding or haematoma in the first 24 hours. 8 (42,1 %) patients had skin sutures removed at bedside with evacuation of clot, due to the presence of stridor and/or hypoxia, before being transferred to operating room. Difficult laryngoscopy Cormack and Lehane grade III was encountered in 4 (21,0 %) patients, grade IV in 2 (10,5 %) patients, while difficult intubation occurred in 1 (5,3 %) patient. There were no cases of impossible intubation or the need for emergency tracheotomy. Data that we obtained are similar to other literature reports of similar cases, although these reports are scarce.
**Conclusion(s):** The fact that securing airway in case of a post-thyroidectomy bleeding and haematoma may be very difficult even for an experienced anaesthesiologist should always be kept in mind. Further research of means for dealing with this situation would be very helpful.

## 13AP04-1

### Protective ventilation improves gas exchange and metabolic response after major abdominal surgery

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**Background and Goal of Study:** Protective perioperative ventilation with low tidal volumes has a potential to improve postoperative outcomes and reduce the risk of pulmonary complications after major surgery.[1] The goal of our study was to assess the effects of ventilation with low tidal volume ($V_T$) either alone or in a combination with permissive hypercapnia in major abdominal surgery.
**Materials and methods:** Forty-six patients (24 males/ 22 females aged 53±10 yrs) scheduled for major abdominal surgery with expected duration > 2 hrs were included into a single-centre prospective study. The patients were randomized to three groups receiving high $V_T$ (10 mL/kg of predicted body weight (PBW), the HVT group, $n$ = 15), low $V_T$ (6 mL/kg PBW, the LVT group, $n$ = 16), and low $V_T$ combined with permissive hypercapnia (6 mL/kg PBW, $PaCO_2$ 45-55 mm Hg, the LVT+HC group, $n$ = 15). All operations were performed using combined inhalational and epidural anaesthesia. Hemodynamic parameters and gas exchange were registered during surgery and up to 72 hrs of the postoperative period. We also analysed the postoperative complications during hospital stay. Data are presented as median ($25^{th}$-$75^{th}$ percentiles) and analyzed using Mann-Whitney's and Fisher's exact tests.
**Results and discussion:** The values of $V_T$ were 619 (570-716), 370 (321-403), and 340 (312-430) mL for HTV, LTV and LTV+HC groups, respectively ($p$ <0.001 compared to the HTV group). We did not find any significant demographic, cognitive, and organ-specific differences between the groups at the baseline. Compared to the HVT group, $PaO_2/FiO_2$ ratio at 24 hrs postoperatively increased in the LVT group: 392 (349-437) vs. 321 (289-358) mm Hg ($p$ <.05), while lactate concentration by the end of the surgery reduced in the LVT+HC group: 1.3 (1.0-2.0) vs. 0.6 (0.5-1.0) mmol/L ($p$ <.05). Patients in the HTV group tended to develop atelectases more frequently ($n$ = 4), compared with the LTV ($n$ = 1) and LTV+HC ($n$ = 1) groups ($p$ = .17).
**Conclusion(s):** Preventive reduction of tidal volume in major abdominal surgery results in improved postoperative oxygenation while combination of low tidal volume and permissive hypercapnia might improve tissue perfusion.
**Reference:**
Futier E et al. N Engl J Med 2013; 369: 428-37.
**Acknowledgements:** We appreciate the assistance of Sokolova M. M., Papko A.A., and Feoktistova M. A.

## 13AP04-2

### Automated versus physician-directed weaning from mechanical ventilation after off-pump coronary artery bypass grafting

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**Background and Goal of Study:** The aim of our study was to assess the efficacy and safety of automated weaning from mechanical ventilation after off-pump coronary artery bypass grafting (OPCAB).
**Materials and methods:** Forty adult patients aged 62 (56 - 68) yrs. after elective OPCAB were enrolled into a prospective randomized study. The informed consent was obtained from each patient in the preoperative period. For respiratory support in ICU we used a G-5 ventilator (Hamilton Medical, Switzerland). Patients were randomized into two groups: automated weaning (n=20), using Adaptive Support Ventilation (ASV)-Intellivent mode with

quick wean option; and physician-directed weaning (n=20), using conventional Synchronized Intermittent Mandatory Ventilation (SIMV) + Pressure Support (PS) mode. The inspiratory pressure, respiratory rate and inspired oxygen fraction ($FiO_2$) were adjusted to maintain tidal volume 6-8 mL/kg of predicted body weight, $EtCO_2$ 35-40 mm Hg, and $SpO_2 \geq 94\%$, respectively. In the SIMV+PS group, every 30 minutes we decreased inspiratory pressure by 2-4 cm $H_2O$ and mandatory respiratory rate by 2-4 bpm. In both groups, patients were extubated immediately after successful spontaneous breathing trial (SBT). Data are presented as median ($25^{th}$-$75^{th}$ percentiles) and analyzed using Mann-Whitney U-test or $\chi^2$-test where appropriate.

**Results and discussion:** Main demographic and preoperative characteristics of the patients, as well as hemodynamics and gas exchange during the study, did not differ between two groups. The average time until tracheal extubation in the automated weaning group was 191 (151 - 231) min vs. 196 (115-308) min in the physician-directed weaning group (p=0.9). Realization of the automated weaning protocol required change in respiratory settings only in one patient vs. 6 adjustments per patient in the physician-directed weaning group. The episodes of deviations from the safe ventilation zone were registered in 12 patients receiving ASV-Intellivent and in 18 patients with SIMV + PS (p=0.035). The $FiO_2$ during SBT was significantly lower in the automated weaning group: 30 (30-35) % vs. 40 (40-45) % in the physician-directed weaning group (p = 0,001). All patients were successfully weaned from ventilator and survived Day 28 of the study.

**Conclusion(s):** Automated weaning from mechanical ventilation after OPCAB is safe, reduces the load on medical staff and does not prolong the duration of ventilation.

## 13AP04-3

### Survey of intraoperative mechanical ventilation strategies in Brazil

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**Background and Goal of Study:** It has been shown that protective mechanical ventilation strategies can reduce postoperative pulmonary complications (PPC) in healthy patients undergoing general anaesthesia. The aim of this study was to identify the mechanical ventilation (MV) strategies used by Brazilian anaesthesiologists and analyse compliance with current medical guidelines.

**Material and methods:** A broad online survey regarding intraoperative MV strategies reached 5677 Brazilian anaesthetists in all 26 states and Federal District. Responding to the questionnaire was optional and no financial encouragement was offered in return.

**Results and discussion:** Only 296 anaesthetists (5.2%) answered the questionnaire. Responders were predominantly male (63%) and had at least 5 years of clinical experience (63%), but fellows accounted for 22% of our study sample. Most responders were based in the Southeast region (74%). Volume-controlled ventilation was the preferred mode for 70.2% of responders, with 45.3% of them using pressure-controlled ventilation when caring for obese patients. The median tidal volume ($V_T$) applied to ASA 1 patients and those at low risk of PPC was 11.6 (10.4-13.8) mL/kg of predicted body weight, but $V_T$ was reduced to 9.5 (8.4-10.5) mL/kg when caring for patients at high risk of PPC (p=0.0001). With regard to PEEP levels, 68.4% of the responders regularly used PEEP of 5 $cmH_2O$ when ventilating healthy patients, while only 2.7% applied zero PEEP strategy. Moreover, 60.3% of responders tended to increase PEEP levels (6-10 $cmH_2O$) when ventilating obese patients. In addition, 40.7% of the anaesthetists tried to limit plateau pressure to 30 $cmH_2O$ for general surgeries and 35.5% used 35 $cmH_2O$ for laparoscopic procedures. When it comes to $FiO_2$, 77.9% chose 40-50% regardless of $SpO_2$. Finally, 68.9% of responders affirmed that they were aware of the concept of protective mechanical ventilation in patients without lung disease.

**Conclusions:** This was the first Brazilian survey of intraoperative MV strategies. Although compliance with low $V_T$ strategies increased when treating patients at high risk of PPC, a noticeable 34.3% of responders did not use these strategies routinely in patients without lung disease, which highlights the need for continuing medical education. Our results could have been biased by the low response rate; nevertheless, this study sheds some light on the compliance with current practice guidelines among Brazilian anaesthesiologists.

## 13AP04-4

### Effect of whole lung lavage on the elimination of CO2 and dead space in patients with pulmonary alveolar proteinosis

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**Background and Goal of Study:** Pulmonary alveolar proteinosis (PAP) is a rare disease characterized by the progressive accumulation of alveolar surfactant and hypoxemia. Whole lung lavage (WLL) is considered to be a standard therapy to improve oxygenation and quality of life in patient with PAP[1]. Although large amount of warmed saline is used in WLL for the drainage of accumulated surfactant in alveoli, there are no established response criteria to evaluate its therapeutic effect.

The aim of this preliminary study is to investigate the effect of single WLL on the efficient alveolar ventilation by measuring the elimination of CO2 and shunt related dead space using 2 patients with PAP.

**Materials and methods:** In 4 trials of WLL in 2 patients, we measured CO2 elimination per breath (VTCO2br) by the indirect calorimetry (the breath by breath technique) and dead space calculated by Enghoff's modification of Bohr's dead space formula (shunt related dead space)[2]. Both parameters were measured before the initiation of WLL (T1) and immediately and 12 hours after WLL (T2 and T3). Extravascular lung water index (EVLWI) was measured by PiCCO. Patients were ventilated with volume control mode with a fixed tidal volume of 6-8 ml/kg constantly during and after WLL.

**Results and discussion:** The volume of saline used for WLL was 10600 ml (left) and 6000 ml (right) in case 1, and 3460 ml (left) and 11150 ml (right) in case 2. VTCO2br at T2 and T3 increased by 3.7 % and 5.3 % compared to that at T1, respectively. Shunt related dead space decreased by 20.8 % at T3 (mean±SD:0.32±5.4) compared to that at T1 (mean±SD:0.40±4.5). Mean EVLWI increased from 11.2 ml/kg before WLL to 14.1 ml/kg 12 hours after WLL. Increase in VTCO2br and decrease in shunt related dead space after WLL indicated that WLL increased efficient ventilation area related to gas exchange. However, lavage fluid might be partially absorbed into pulmonary interstitium, resulting in increase in extravascular lung water.

**Conclusion(s):** WLL improved efficient alveolar ventilation by decreasing the shunt area in 2 patients with PAP.

**References:**

1. R. Borie, et al. Pulmonary alveolar proteinosis. Eur Respir Rev 2011;20:98-107
2. Suarez-Sipmann F, et al. Volumetric capnography: the time has come. Curr Opin Crit care 2014;20:333-339

## 13AP04-5

### Lung derecruitment during general anaesthesia with constant positive end-expiratory pressure

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**Background and Goal of Study:** Previous studies have failed to demonstrate a significant reduction in postoperative pulmonary complications with the use of positive end-expiratory pressure (PEEP) during general anaesthesia. The aim of this pilot study was to evaluate the behaviour of pulmonary aeration during general anaesthesia and mechanical ventilation (MV) with continuous use of PEEP.

**Materials and methods:** A thirty-nine year-old ASA P2 female undergoing facial plastic surgery was kept on volume-controlled ventilation for 9 hours. The ventilator was set to $V_T$ = 8 mL/kg of predicted body weight, PEEP=5 $cmH_2O$, and $FiO_2$=50%. While $V_T$ and PEEP were kept constant throughout the procedure, respiratory rate was adjusted in order to keep end-tidal $CO_2$ between 35 and 45 mmHg. Recruitment maneuvers were not performed. Regional lung aeration (dependent vs. non-dependent regions), inferred by the end-expiratory lung volume (EELV) was evaluated with electrical impedance tomography before and immediately after intubation, and every hour until extubation.

**Results and discussion:** There was a marked decrease in EELV two minutes after induction of general anaesthesia, which was followed by a gradual and sustained reduction of EELV. At one hour, EELV had been reduced by 1194 mL, but from this time-point on the speed of EELV decline was significantly attenuated. By the end of the procedure, EELV was 1980 mL lower than at baseline, which was driven primarily by a loss of aeration in dependent regions (1626 mL or 82% of total decrease in EELV). Moreover, the distribution

of ventilation was significantly altered after anaesthesia induction as there was a clear shift of ventilation from dependent to non-dependent regions (56%/44% to 36%/64%).
**Conclusion(s):** This hypothesis-generating case study showed that mechanical ventilation without recruitment maneuver during general anaesthesia causes abrupt loss of lung aeration and ventilation redistribution from dependent to non-dependent regions. In addition, PEEP of 5 $cmH_2O$ was unable to prevent the loss of lung volume, which was more pronounced in dependent regions.

## 13AP04-6

### Temporal changes in ventilator settings in patients with uninjured lungs - a systematic review

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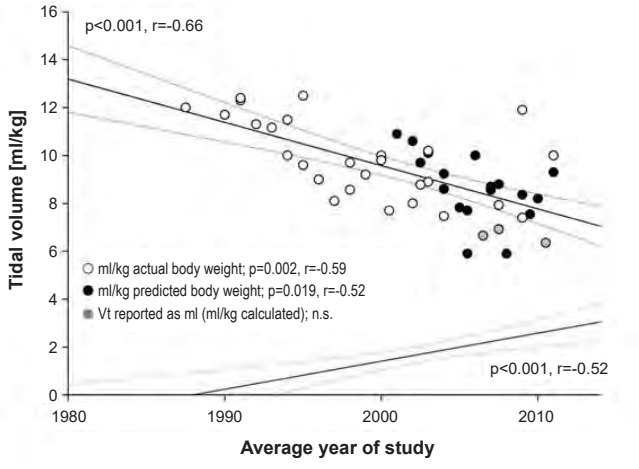
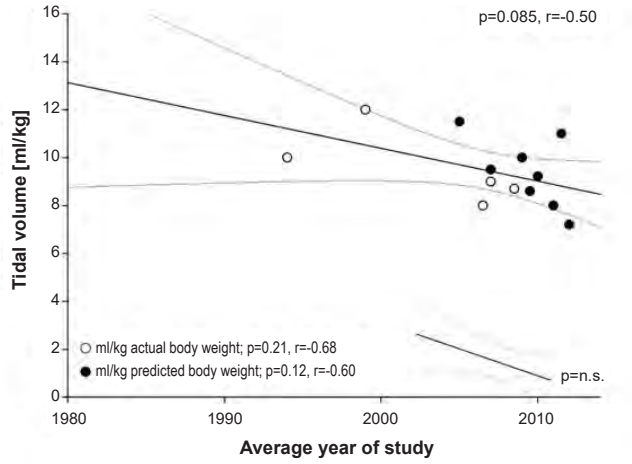
**Background:** Increasing evidence shows beneficial effects of tidal volume ($V_T$) reduction during mechanical ventilation in patients with uninjured lungs under care in the intensive care unit (ICU), as well as the operation room (OR) (1). However, it takes years for implementation of evidence into clinical routine (2). Therefore, we performed a systematic review of published literature to determine temporal change in ventilator settings.
**Methods:** We searched MEDLINE, CENTRAL and Web of Science for publications involving mechanical ventilation of adult patients in the ICU or OR. Studies involving more than 25% of patients suffering from ARDS at study onset were excluded. Our primary end point was temporal change of $V_T$ size. Secondary end points included temporal change of $V_T$ variance as well as maximum ($P_{max}$) and mean ($P_{mean}$) airway pressure, positive end-expiratory pressure (PEEP), inspiratory $O_2$ fraction ($F_iO_2$), development of ARDS in the ICU and postoperative pulmonary complications. Spearman's rank correlation and linear regression analysis were applied.
**Results:** We included 40 ICU and 15 OR studies with a total of 67,941 patients from 56 countries. In ICU studies, $V_T$ size decreased over 25 years by 0.2ml/kg per year ($p<0.001$) to a median 8.3 [IQR 6.3;8.7] ml/kg, while variance increased significantly (figure 1). Correspondingly, $P_{max}$ decreased by 0.74 cmH2O per year ($p=0.001$). No temporal changes were detected in $P_{mean}$, PEEP, $F_iO_2$ or development of ARDS. In OR studies, VT size had a trend to decrease by 0.14 ml/kg per year ($p=0.085$, figure 2). There were no temporal changes in $P_{max}$, $P_{mean}$, PEEP, $F_iO_2$ and incidence of postoperative pulmonary complications.
**Conclusion:** In patients with uninjured lungs, $V_T$ size has decreased over the last 25 years. This change was more pronounced in ICU than in OR patients.
1. JAMA 2012;308:1651-9.
2. J R Soc Med 2011;104:510-20




*[Figure 1. Temporal changes in tidal volume in the intensive care unit. Each dot represents one study (arm). Upper line: linear regression of temporal changes in tidal volume size with 95% confidence interval. Lower line: linear regression of temporal changes in tidal volume variance with corresponding 95% confidence interval]*




*[Figure 2. Temporal changes in tidal volume in the operation room. Each dot represents one study (arm). Upper line: linear regression of temporal changes in tidal volume size with 95% confidence interval. Lower line: linear regression of temporal changes in tidal volume variance with corresponding 95% confidence interval]*

## 13AP04-7

### Monitoring atelectasis and tidal recruitment using lung ultrasound in an anesthetized child. A case report

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**Background:** Lung ultrasound (LUS) is an accurate, safe and non-invasive method for diagnosing atelectasis and tidal recruitment (TR), conduct lung recruitment maneuvers and individualize positive end-expiratory pressure (PEEP).
**Case report:** A 4-year-old ASA I anesthetized child scheduled for laparoscopic surgery, protective ventilation was applied using volume controlled ventilation (tidal volumen: 6 ml/kg, respiratory rate 25, I:E ratio 1:1.5, PEEP 5 $cmH_2O$ and $FIO_2$ 0.5. Immediately after anesthesia induction the patient showed plateau pressure of 24 $cmH_2O$ and $SpO_2$ 95%. LUS was performed with a linear HF probe (6-12 MHz) showing atelectasis and TR in dependent, para-diaphragmatic lung areas. Most of atelectatic area observed at end expiration disappeared at the end of the next inspiration (i.e it was tidally recruited). Lung recruitment maneuver - a brief and controlled step-wise increment in airways pressure to re-expands atelectasis - was performed. LUS images showed resolution of atelectasis during such maneuver. Later on, a protective ventilation pattern was reassumed but with PEEP 9 $cmH_2O$ to maintain the lungs free of atelectasis. This ventilatory pattern resulted in a plateau pressure 18 $cmH_2O$, $SpO_2$ 100% ($FIO_2$ 0.3) without the presence of atelectasis nor TR in LUS images.
**Discussion:** Point-of-care LUS is a noninvasive method helpful to assess lung aeration.[1] This tool was accurate for diagnosing anesthesia-induced atelectasis in children.[2] Likewise the high time-resolution of LUS images is a key feature to detect TR within atelectasis, one of the proposed mechanisms of ventilator-induced lung injury (VILI). This case illustrates how the atelectatic area appeared as a LUS consolidation pattern that cyclically changes during breathing; confirming the presence of this mechanism of VILI in healthy lung ventilated with a lung protective setting. Moreover, the elimination of the consolidated lung area by means of a recruitment maneuver confirmed the elimination of the mechanism of TR. LUS can therefore become a valuable monitoring tool to prevent VILI at the bedside.
**References:**
1. Bouhemad B, et al. Anesthesiology 2015;122:437-47
2. Acosta C, et al. Anesthesiology 2014;120: 1370-9
**Learning points:** LUS could identify children with atelectasis and RT. Their resolution by lung recruitment together with an optimal setting of PEEP can be easily guided with LUS, helping anesthesiologists optimize ventilator strategy in operating rooms.

## 13AP04-8

### Does pulmonary compliance optimization through PEEP manipulations reduces the incidence of postoperative hypoxaemia in bariatric surgery?

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**Background and Goal of Study:** In obese surgical patients (OP), the best intraoperative ventilation strategy remains to be defined[1]. Dynamic pulmonary compliance ($C_{dyn}$) and dead space fraction are indicators for efficient ventilation at an optimal PEEP[2]. The aim of this prospective randomised controlled double blind study was to determine if intraoperative $C_{dyn}$ optimization through PEEP manipulations affects the incidence of postoperative hypoxaemia (PH) in OP undergoing laparoscopic bariatric surgery.
**Materials and methods:** One hundred OP scheduled for gastric bypass or sleeve gastrectomy were randomized according to the level of PEEP maintained during the surgery. In the control group, a PEEP of 10 $cmH_20$ was applied. In the study group, the PEEP level was adapted to achieve the best $C_{dyn}$ determined by the ventilator (Aisys $CS^2$, GE Healthcare, USA). OP were ventilated with a tidal volume of 8ml/kg ideal body weight and an inspired oxygen fraction of 0.5. Recruitment manoeuvres were allowed when pulse oximetry saturation ($SpO_2$) was below 95%. OP received supplemental nasal oxygen (3L/min) during the first postoperative day (D1) and were monitored up to D2 with a portable pulse oximeter (OxyTrue®, Blue Point Medical, Germany). Primary objective was the incidence of PH ($SpO_2$ <90%) during D1 and D2. Data between groups were compared using Mann-Whitney-U or Chi-square tests and presented as median [interquartiles] or percentage. A $p<0.05$ was considered significant. NCT02579798.
**Results and discussion:**

| | Control group (n=50) | Study group (n=50) | p |
|---|---|---|---|
| Age (years) | 40 [27-47] | 42 [31-48] | 0.366 |
| BMI (kg/m2) | 42 [39-45] | 42 [40-45] | 0.588 |
| Time Procedure (min) | 88 [65-135] | 115 [79-160] | 0.136 |
| Mean SpO2 D1 (%) | 98 [97-99] | 97 [95-98] | 0.012 |
| Mean SpO2 D2 (%) | 96 [94-97] | 96 [93-97] | 0.230 |
| Hypoxaemia time D1 (%) | 0.6 [0.2-2.0] | 0.7 [0.2-3.0] | 0.462 |
| Hypoxaemia time D2 (%) | 2.5 [0.6-5.5] | 2.6 [0.8-10.0] | 0.535 |
| Total hypoxaemia time (%) | 1.3 [0.5-3.7] | 2.1 [0.8-8.5] | 0.264 |

*[Demographic variables and primary outcome]*

$C_{dyn}$ was significantly higher in the study group than in the control group although PEEP was not significantly different between groups. $PaO_2/FiO_2$ ratio was not different between groups throughout the surgery. No OP developed pulmonary complication up to 30 day postoperatively.
**Conclusion:** In the conditions of our study, $C_{dyn}$ optimization through PEEP manipulations did not reduce the incidence of PH.
**References:**
1. Aldenkortt M. and al. Br J Anaesth 2012.
2. Maisch S. and al. Anesth Analg 2008.

## 13AP04-9

### The optimal positive end-expiratory pressure according to mechanics of respiratory system, chest wall and lung during laparoscopic surgery

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**Background and Goal of Study:** Pneumoperitoneum and Trendelenburg position during laparoscopic surgery are considered to promote alveolar collapse and hypoxia due to increase of chest wall elastance. In our study, we compared several method to determine the optimal positive end-expiratory pressure (PEEP) level to prevent alveolar collapse during laparoscopic surgery.
**Materials and methods:** In 10 patients without lung disease undergoing robot-assisted laparoscopic prostatectomy (RALP), we raised PEEP level step by step (0, 2, 4, 6, 8, and 10 $cmH_2O$) after lung recruitment maneuver, at the condition of pneumoperitoneum and Trendelenburg position. Airway pressure, tidal volume and esophageal pressure (measured by esophageal catheter) were recorded, and we calculated respiratory system compliance, chest wall compliance, lung compliance and end-expiratory transpulmonary pressure ($PL_{exp}$) at each level of PEEP. We also measured pressure-volume (P-V) curve to measure those mechanics in detail and to measure inflated lung volume at maximum airway pressure (40 $cmH_2O$) which might reflect the amount of collapsed lung volume. Data was analyzed by one-way ANOVA with repeated measures and Tukey test as post-hoc analysis.
**Results and discussion:** Respiratory system, chest wall, and lung compliance during ventilation almost didn't change as PEEP level increased. Respiratory system and lung compliance calculated from P-V curve were higher at 0 $cmH_2O$ than those of other PEEP level, especially 10 $cmH_2O$ ($p<0.05$). Total inflated lung volume during P-V curve measurement decreased in accordance with increase of PEEP level ($p<0.001$). These findings may indicate that even 2 or 4 $cmH_2O$ of PEEP would be effective to prevent alveolar collapse. $PL_{exp}$ increased when PEEP increased, but didn't reach 0 $cmH_2O$ in most patients even when PEEP was 10 $cmH_2O$. Although there was no patients with serious hypotension during measurement, mean blood pressure decreased as PEEP increased. Therefore, the enough level of PEEP to prevent alveolar collapse completely during laparoscopic surgery might be much higher than 10 $cmH_2O$, and it can be dangerous for hemodynamic status.
**Conclusion:** Esophageal pressure measurement might be a good reference to determine the PEEP level during laparoscopic surgery, but the best way to know the optimal PEEP level is still unknown. It is possible that a small amount of PEEP is effective to improve respiratory system mechanics safely.

## 13AP04-11

### Jet-ventilation during airway plugging of right upper and middle lobe bronchi

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**Background:** Broncho-pleural fistulation is a dreaded complication of lung surgery. There are many ways to treat this including several surgical techniques.
**Case report:** 49 yo female, history of APC deficiency. Pseudomyxoma peritonei since 2005, a very rare disease (1-3 cases / million yearly) which usually affects the abdomen with mucus producing tumors. It usually arises in the appendix but may also be of ovarian origin. The patient had undergone multiple abdominal procedures. Extremely rarely, as in this case, the disease progresses to the thorax and she underwent partial pleurectomy, partial pericardectomy and subtotal upper right lobectomy. A broncho-pleural fistula developed, with subsequent recurring pneumothorax, and attempts at surgical closure were unsuccessful.
We report a case of plugging the remaining right upper lobe bronchi and a branch of the middle lobe with three Endobronchial Watanabe Spigots (EWS®, Novatech). A 5mm flexible bronchoscope carried the EWS through a 9.4 mm inner diameter rigid bronchoscope connected to a Twin-Stream Superimposed High Frequency Jet ventilator (SHFJ®, Carl Reiner GmbH) with normal frequency 12 bpm and high frequency jet ventilation 1200 bpm respectively. Carbon dioxide was measured transcutaneously (Philips IntelliVue TcG10). Upper positive inspiratory pressure (PIP) was 35 mBar. We elected to

interrupt ventilation for short periods during the final placement of the individual EWS and were sometimes forced to do so when the rigid bronchoscope was placed too far distally towards the right main bronchus. The procedure was seemingly successful, as no air could be aspired through the pleural drainage postoperatively.
**Discussion:** There were no oxygen saturation problems. SHFJ ventilation appears to be a safe way of ventilation in tricky cases with partial obstruction of the airways, even when the obstruction is increased due to plugging of lung lobe bronchi. Close communication and team work with the ENT surgeon and the pulmonologist are essential.
**Reference:**
Pestieau et al, *Pleural extension of mucinous tumor in patients with pseudomyxoma peritonei syndrome*, Ann Surg Oncol. 2000 Apr;7(3):199-203
**Learning points:** Jet ventilation can be used during plugging of the lung bronchial lobes in persistant bronchopleural fistulations.

## 13AP04-12

### Electromyographic activity of the diaphragm during neostigmine, sugammadex, or neostigmine-sugammadex enhanced recovery after rocuronium

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**Background and Goal:** Electromyographic activity of the diaphragm (EMGdi) during weaning from the ventilator is increased after sugammadex compared with neostigmine[1]. This may be caused by 1. a sugammadex effect at the neuromuscular junction or 2. a reduction in phrenic nerve activity by neostigmine. This study determines whether the effect of sugammadex or neostigmine dominates on the EMGdi after a combination of neostigmine followed by sugammadex.
**Materials and methods:** This was a double-blind randomized trial in 18 healthy volunteers (3 groups of 6 individuals) (EC approval 2015/029). Individuals were anaesthetised with propofol and remifentanil and a transoesophageal NAVA EMG catheter (Maquet) was inserted. At T2 of the train-of-four (TOF) the first group received neostigmine 50$\mu$g/kg; the second group sugammadex 2mg/kg; the third group neostigmine 50$\mu$g/kg followed 3min later by sugammadex 2mg/kg. Upon TOF≥0.9 the minute volume was reduced and ventilation was switched to CPAP. EMGdi, airway pressure and flow were continuously measured during weaning until tracheal extubation. The maximal EMGdi value from start to end of inspiratory flow was selected as peak EMGdi. Comparison between groups was performed using Kruskal-Wallis ANOVA, followed by Dunn's Multiple Comparisons test.
**Results and discussion:**

| | Neostigmine | Sugammadex | Neostigmine-Sugammadex | *P value* |
|---|---|---|---|---|
| **Overall peak EMGdi ($\mu$v)** | 0.76 (1.20-1.80) | 1.00 (1.23-1.82) | 0.70 (0.91-1.21) | P<0.0001(a) |
| **Peak EMGdi >0.5$\mu$v ($\mu$v)*** | 0.78 (1.29-1.96) | 1.04 (1.27-1.90) | 0.74 (0.96-1.28) | P<0.0001(b) |

*[Table1]*

Table 1. Data are expressed as median (95% CI).
(a) Neo *vs* sug P<0.01, neo *vs* neo-sug ns, sug *vs* neo-sug P<0.001 -
(b) Neo *vs* sug P<0.05, neo *vs* neo-sug ns, sug *vs* neo-sug P<0.001.
*Breaths excluded with associated EMGdi not exceeding 0.5$\mu$V.
EMGdi was increased after sugammadex compared with neostigmine or neostigmine followed by sugammadex. This reflects diaphragm-driven inspiration after sugammadex.
Prior treatment with neostigmine seems to undo this. Although sugammadex may free more diaphragmatic acetylcholine receptors than neostigmine, this study shows that neostigmine may reduce EMGdi activity that cannot be undone by sugammadex.
**Conclusion:** EMGdi was increased after sugammadex alone compared with neostigmine or neostigmine-sugammadex. This may be thanks to a sugammadex effect on neuromuscular transmission at the muscle level, but can also be explained by neostigmine-induced decrease in total phrenic nerve activity.
**Reference:**
1. EJA 2015;32:49-57

## 13AP05-1

### Predicting (and managing) the morbid obesity-difficult airway (MODA)

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**Background and Goal of Study:** Fiberoptic intubation (FOI) is now performed very infrequently in morbidly obese (MO) patients undergoing elective weight loss surgery (WLS). Prior to the introduction of videolaryngoscopy, the need for FOI had been estimated at 5-10% [1]. Since then others have estimated the need for FOI in MO to be in the 1-5% [2].
The objective of this study was to review literature for predictors of DA in MO, report its described management and comment on the pharmacologyof MODA.
**Materials and methods:** Using specific keywords for predictors, management and pharmacology of Difficult Airway (DA) management in Morbid Obesity (MO), we performed a search of peer reviewed literature search. Using expert opinion and the Delphi technique, we sought to develop consensus for an DA prediction rule specific to MO. We then revised and redeveloped an existing DA algorithm for anticipated difficulty and customized it with modalities specific to MO.
**Results and discussion:** We summarize the findings of our literature search for predictors of Difficult Airways in MO in Table 1. Based on our literature search and expert opinion, we present a DA algorithm for MO in Figure 1. The pharmacology of MODA, requires the appropriate use of short acting drugs, titrated to the desired effect for the MODA.
In the general population, MO was/ is frequently identified as a predictor of anticipated DA [1]. Now extensive experience in WLS suggests that in MO other predictors are required to identify patients requiring advanced airway management strategies [3]. Conventional DA algorithms suggest that supraglottic devices and surgical airways are both effective 'rescue' techniques in certain situations where an unanticipated DA is encountered [4]. Experience in MO suggests that alternative management strategies are required in MODA [5]. Also important is the choice, dose and technique of drugs administered during DA management [6].
The avoidance of succinylcholine and judicious use of propofol, remifentanil and/ or dexmedetomidine can improve the safety, success and outcomes in MODA.
**Conclusion(s):** We propose a simple algorithm that incorporates the predictors and management of the MODA. While further research and expert opinion are required to standardize the MODA, this preliminary work may be an important first step in this direction.
**References:**
1. Hagberg CA 2009.
2. Caldiroli D 2011.
3. Sheff SR 2013.
4. Frerk C 2015.
5. Eipe N 2014.
6. Cattano D 2012.

## 13AP05-2

### Can we predict difficult airway?

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**Background and Goal of Study:** Detailed airway examination prior to surgery is essential for planning airway management, primordial when dealing with difficult airway (DA). Anesthetists' prediction of DA is not completely reliable.It only occurs accurately in a low proportion of cases (7-50%[1,2]). This study aims to evaluate the ability to predict DA in our institution.
**Materials and methods:** An electronic medical registry alert for difficult airway cases exists in our institution. We performed an observational retrospective study after the Hospital Ethics Committee approval including all patients with this alert between 2011 and 2014. Data was collected from Electronic Clinical Process and DA Reports. Demographic data and preoperative DA prediction were registered.
**Results and discussion:** 343 patients included. 73% male, median age 58 years old (range 0-97). ASA physical status: 17 patients ASA I, 165 ASA II, 120 ASA III, 31 ASA IV and 3 ASA V. Emergent procedures:18%. All patients had an airway evaluation in the operating room. 186 patients were also evaluated previously (at the ward or at a previous anaesthetic consultation). Screening

tests included:Mallampati classification, thyromental distance, cervical mobility, mouth opening and auxiliary image exams when applicable. Of all DA cases, 67% (n=231) were considered to have predictable DA. Considering only the emergent procedures, 53% (n=33) had a predictable DA. The evaluation made by different professionals at two different times (consult/ward visit and operating room) was concordant in 82%. In our institution, the prediction of a DA occurred at higher rate than that described in literature. There are still a great proportion of patients in which DA management is unpredictable. There is also a considerable variability between interpersonal airway evaluations. An insufficient airway assessment or the use of subjective parameters could explain this.

**Conclusion:** In our institution, we anticipated 67% of DA patients. To raise predictability, new parameters should be studied and included in our routine assessment. This will enable us to adopt better strategies and to increase the safety of our practice.

**References:**

1. Assessment before airway management.Anesthesiol Clin.2015Jun;33(2):257-78.
2. Diagnostic accuracy of anaesthesiologists' prediction of difficult airway management in daily clinical practice:a cohort study of 188064 patients registered in the Danish Anaesthesia Database.Anaesthesia 2015; 70: 272-81.

## 13AP05-3

### Difficult intubation in a patient with unknown subglottic stenosis

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**Background:** Difficult intubation is defined as the need for multiple attempts to intubate with or without tracheal disease. One of the causes is subglottic stenosis. Congenital subglottic stenosis usually presents with varying degrees of dyspnea. Acquired causes include prolonged intubation, tumors or trauma. In symptomatic patients, the diagnosis can be made by x-ray or CT-scan. Rarely there are asymptomatic patients, and these are a challenge to the anesthesiologist, as they present as unexpected difficult intubation because of difficulty in the progression of the tube after it has passed between the vocal cords.

**Case report:** 46-year-old patient ASA II (obesity) admitted for elective vaginal hysterectomy to correct a complete uterovaginal prolapse. No previous surgeries or trauma or predictive signs for difficult ventilation or intubation. No relevant changes in the pre-op exams. General anesthesia with ev induction. Grade I laringoscopy. It was only possible to intubate with a number 4 mycrolaryngeal tube because of resistance to progression encountered after the vocal cords.

The surgery was postponed and the patient was extubated without incidents. The patient referred no dyspnea or dysphagia, only occasional dysphonia. Otolaryngologic evaluation, fibroscopy and CT-scan showed narrowing in a level immediately sub-glottic with an extension of 13mm with airway permeability preserved. It was considered that the cause was congenital. The surgery was rescheduled and a sequential anesthesia was performed without incidents.

**Discussion:** This case presented as an unexpected difficult intubation. There are few reports of asymptomatic subglottic stenosis and the decision on how to proceed varies with the ability to approach the airway and with the type of surgery.

**References:**

Rani N. U. Ramez S. M. Michael, F. Richard. L. F. MD (1995) Acute Management of Unsuspected Subglottic Stenosis by Tracheal Dilation. Anesthesia & Analgesia Volume 80 Issue 4 - pp 841-843
Low, J. H. Smith, R. The management of laryngeal and subglottic stenosis (2006) Br. J. Anaesth. 96 (6): 803-804.

**Learning points:** Asymptomatic subglottic stenosis is a rare condition that may present as an unexpected difficult intubation and has high anesthetic risk. The necessity and urgency of the surgery must be considered when deciding how to procede - awake the patient and find the diagnosis or approach the airway differently (subglottic device or invasive surgical airway).

## 13AP05-4

### Correlation of neck circumference with difficult mask ventilation and difficult laryngoscopy in morbidly obese Turkish patients: a prospective clinical trial

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**Background and Goal of Study:** General anesthesia and airway management is challenging in morbidly obese patients due to excessive fat tissue. It is suggested that neck circumference is associated with difficult mask ventilation and difficult laryngoscopy.

The aim of our study is to determine if neck circumference, Mallampati score, upper lip bite test, neck mobility, teeth abnormalities, mouth opening; sternomental and thyromental distances; neck, thoracic, breast, belly and hip circumferences are predictors for difficult mask ventilation and difficult laryngoscopy in morbidly obese Turkish patients.

**Materials and methods:** After getting Ethics Committee approval and patient consent, we enrolled 120 morbidly obese (Body Mass Index (BMI)≥40 kg/cm$^2$), American Society of Anesthesiologists classification I-III patiens with age >18 scheduled for elective surgery. Ventilation difficulty was evaluated as defined by Han et al[1]. Direct laringoscopy was performed and Cormack Lehane scores III and IV were defined as difficult intubation. Student's t test, Mann-Whitney U test,Fisher's exact test or Chi-square test were used for statistical evaluation.

**Results and discussion:** 120 (37 male, 83 female) patients were included to study. Difficult mask ventilation was more frequent in males(21,6%) compared to females(2,4%). Mouth opening lower than 6,5cm was found as a significant predictor for difficult mask ventilation in male patients with a 62,5% specificity and 100% sensitivity. Difficult laryngoscopy was more frequent in male (10,8%) than female (3,6%) patients. Mallampati scores 3 and 4 were found as a significant predictors for difficult laryngoscopy in female patients with a 92,54% specificity and 75% sensitivity. Neck circumference was not found a statistically significant predictor for difficult mask ventilation and difficult laryngoscopy. It is suggested that neck circumference is associated with difficult mask ventilation and difficult laryngoscopy. The reason of the difference between literature and this study might be related to gender-based analysis as we have evaluated female and males separately.

**Conclusion:** Neck circumference is not a good predictor of difficult laryngoscopy in the morbidly obese patient in Turkey.

**Reference:**

1. Han R et al. Grading scale of mask ventilation. Anesthesiology 200;101:267.

## 13AP05-5

### The DAMS Tulip™: initial assessment of performance as a new tool for assisting bag valve mask ventilation and fiber optic intubation

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**Background and Goal of Study:** Even now, fiberoptic bronchoscope(FOB)-guided intubation(FOI) is a preferred choice for difficult airway management. The DAMS Tulip™ (SENKO MEDICAL INSTRUMENT mfg. CO., Ltd, Tokyo, Japan) is a new tool (Figure 1) to assist Bag Valve Mask (BVM) ventilation and FOI, with the following specific functions:

1. Facilitation of straight advancement of the FOB to the glottis
2. Upward lifting of the epiglottis in a unique manner
3. Alternative function as an airway and a useful aid for BVM ventilation.

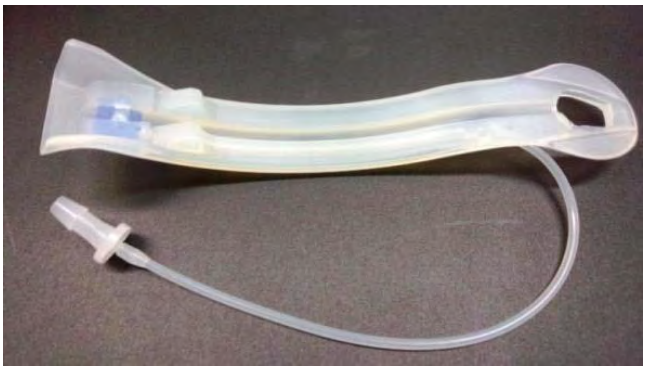
This study aimed is to assess the utility of the equipment for BVM ventilation and FOI.

**Materials and methods:** Twenty seven adult patients (age range: 26-84 years, women: men=15:12, BMI: 17-36, ASA-PS: 1-3) undergoing elective surgical procedures were enrolled. The equipment was inserted, with the patient under general anesthesia, BVM ventilation was attempted without any assistive techniques, e.g. the jaw lift. We then set the FOB on the equipment channel, inserted it, tried to reach its tip to the vocal cords, and recorded the time taken for the procedure.

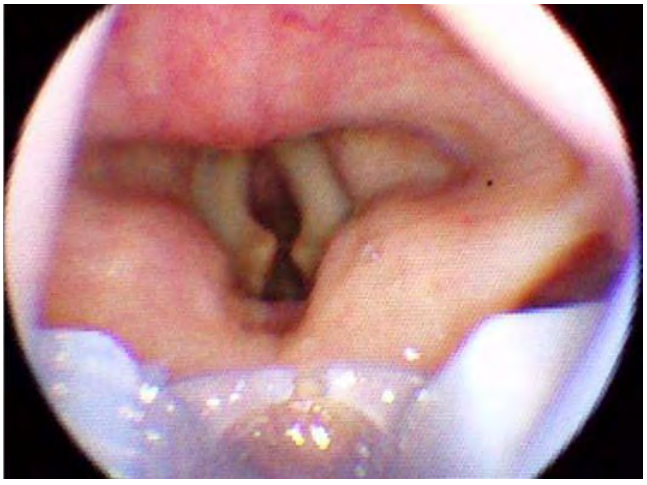
**Results and discussion:** Inserting the equipment was easy, and BVM ventilation was successfully achieved in all patients without any of the techniques mentioned above.

The FOB was advanced straight along the equipment path to the vocal cords. The equipment lifted the epiglottis upward (Figure 2), which facilitated easy detection of the vocal cords in all cases. The mean time taken for the procedure was 5.52 seconds (range. 3-10 s). All procedures were performed without aid from other staff.

**Conclusions:** The DAMS Tulip™ lifted the epiglottis upward, maintained an open airway, and ensured clear visibility of the vocal cords. It is useful as an airway for BVM ventilation and an assistive device for FOB intubation under general anesthesia.



*[Figure 1]*



*[Figure 2]*

## 13AP05-6

### The use of Cook© airway exchange catheters (AEC) in the extubation of patients with difficult airway - a report of two cases

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**Background:** The significance of planned extubation in cases of difficult intubation and at-risk extubation has been highlighted by DAS extubation guidelines[1] and NAP4[2]. An AEC can be used to aid safe extubation if left in situ and used to railroad an endotracheal tube should re-intubation become necessary[3]. We report two cases where AEC was used to aid safe extubation.

**Case reports:**

1. A patient presented for biopsy of base of tongue tumour. Intubation was difficult because the tumour impeded the advancement of Macintosh and Aitraq© laryngoscopes. Fibreoptic intubation (FOI) was unsuccessful due to bleeding, which obscured the view. Intubation was achieved using Kingvision© laryngoscope. As the tumour itself was left in situ, reintubation in the immediate postoperative period was predicted to be difficult. So at the end of surgery, the patient was extubated over an oral 14Fr AEC.
2. An obese patient presented for completion of thyroidectomy. Difficult intubation was anticipated (limited mouth opening, short neck, history of snoring and previous grade III laryngoscopy view). He also had respiratory symptoms secondary to unilateral vocal cord palsy following previous hemi-thyroidectomy. An awake nasal FOI was carried out. The recurrent laryngeal nerve (RLN) on the operative side was not identified during surgery. There was a possibility of RLN damage and airway compromise after extubation. So at the end of surgery, the patient was extubated over a nasal 11Fr AEC.

Both patients tolerated the AEC and did not require re-intubation. AEC's were removed in PACU 3 hours and 1 hour later, respectively.

**Discussion:** An AEC is designed to aid oxygenation and bridge re-intubation in patients with difficult airway. Evidence of their use in clinical setting is limited and the largest series is by Mort[3]. AEC's are bulky and rigid, and may cause discomfort in awake extubated patients. The Cook© Staged Extubation Set (SES) is designed to leave a wire in the trachea, which can be used for re-intubation, should it become necessary. Single centre experience with the SES was recently presented at WAMM[4].

**References:**

1. Popat M et al. *Anaesthesia* 2012; **67(3)**: 318-340
2. http://www.rcoa.ac.uk/system/files/CSQ-NAP4-Full.pdf
3. Mort TC. *Anesth Analg* 2007; **105(5):** 1357-62
4. Carmen L, Goddard H. World Airway Management Meeting. Dublin 2015.

**Learning point:** Various AEC's can be used as aids to safe advanced extubation technique in selected patients with difficult airway.

## 13AP05-7

### PAPAYA: Prospective Assessment Project on AirwaY management in Anaesthesia - improving airway management and patient safety through optimisation of airway management strategies

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**Background and Goal of Study:** Problems with airway management are a leading cause of anaesthesia-related morbidity and mortality.[1] Numbers of major airway complications revealed by the 4th National Audit Project[2] are alarming, but we still do not know how to decrease airway complications. Relating to the concept of accumulation of marginal gains[3] our study tests the hypothesis that the sum of effects that result from changes to institutional airway management strategies and from airway management teaching will lower the total number of airway incidents substantially.

**Materials and methods:** The study is a prospective trial. In the first phase we prospectively scrutinised all major and minor airway incidents occurring at the anaesthesia department of the University Hospital Bern during 2 months. We specifically included minor incidents as precursors of major incidents (Swiss Cheese Model).[4] After analysis of the recorded incidents we now implement changes to the institutional airway management strategies and teach specific aspects of airway management. This will be followed by another period of prospective recording of all airway incidents to evaluate if airway management was improved.

**Results and discussion:** During the 2 months of phase 1, 3681 cases of airway management were screened. 11 cases were missed, but the remaining 3670 cases were analysed. 574 anaesthesia cases (15.6%) involved at least one major or minor airway management-related incident. Out of these patients 187 presented more than one incident, leading to a total of 830 incidents. The most common incidents were difficult bag mask ventilation (24.4%), need for several attempts to secure the airway (20.9%), Cormack-Lehane grade ≥3 (18.3%), hypoxia (17.8%), failed tube advancement (11.0%) and oesophageal intubation (8.2%).

**Conclusions:** Our study shows that major or minor airway management-related incidents occur in over 15% of anaesthesia cases. Based on these data we are implementing a "package" of changes to institutional airway management strategies and teach aspects of airway management. The follow-up phase in April-May 2016 will show whether this "package" can improve airway management and thereby improve patient safety. First follow-up data will be shown at the ESA.

**References:**

1. Peterson et al. Anesthesiology 2005;103:33-9
2. Cook et al. Br J Anaesth 2011;106:617-31
3. Durrand et al. Anaesthesia 2014;69:403-6
4. Reason. BMJ 2000;320:768-70

## 13AP05-8

### Post-intubation tracheal tear in myomectomy patient!

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**Background:** Twelve hours after extubation, a 33 year-old woman developed extensive subcutaneous (surgical) emphysema, involving the neck, and upper chest extending from skull base down to the mediastinum left sided pneumomediastinum and pneumothorax, was confirmed by neck and chest CT-scan. The location of the lesion and features of the patient favored conservative treatment with antibiotic cover.
The patient made a full and uncomplicated recovery and was discharged ten days after the original injury.
**Case report:** A 33-year-old woman was scheduled for abdominal myomectomy under general anesthesia. After induction of anesthesia,oral intubation was performed without difficulty.The cuff was inflated with 7 ml of air.Six hours after extubation patient started to complain of shortness of breath, and chest discomfort,ECG was normal sinus rhythm, ABGS was done “on room air”: PO2 80mmHg and O2 sat,96% improved on O2 face mask and no shortness of breath any more.Twelve hours after extubation, the anesthesiologist was requested because the patient had suddenly developed subcutaneous emphysema of the facial, bilateral laterocervical and upper anterior chest. She hadn’t chest pain and dyspnoea. A thoracic computed tomography (CT) showed: Extensive subcutaneous (surgical) emphysema, involving the neck and upper chest extending from skull base down to the mediastinum,moderate left sided pneumomediastinum and pneumothorax,defect 40x10 mm is seen in the posterior (membranous) portion of dorsal trachea from the level D1-D3Traumatic Tracheal tear was suspected, and Patient was transferred to surgical ICU, and chest tube was inserted.
**Discussion:** Tracheal disruption following intubation is a rare entity [1]. Proposed risk factors for this injury relate to the patient, the operator, the endotracheal tube, the technique of intubation and the anesthesic management [1,2]. Often, this appears to be caused by a combination of these factors [1]. Although in some of the cases, the cause remained unknown [1].
**Learning points:** This case report presented an iatrogenic post-intubation tracheal tear treated conservatively. It illustrates the effectiveness of the non-surgical therapeutic strategy of a large tracheal injury. Selection of treatment for post-intubation tracheal tear must remain individualized. But this case illustrates the current tendency to increase conservative therapy in this pathology.

## 13AP05-9

### Bilateral arytenoid dislocation and fixation - a rare cause of difficult intubation

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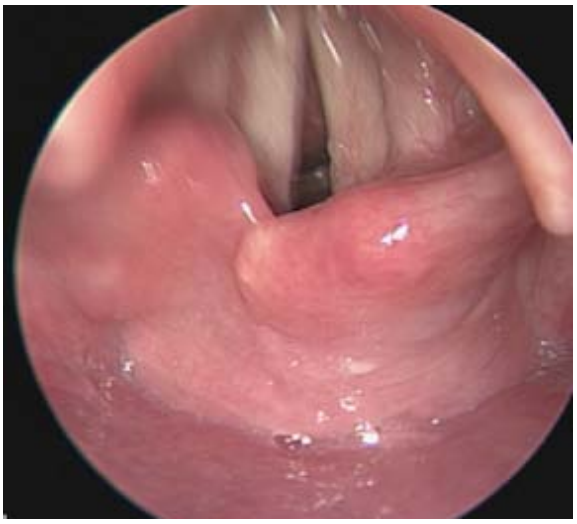
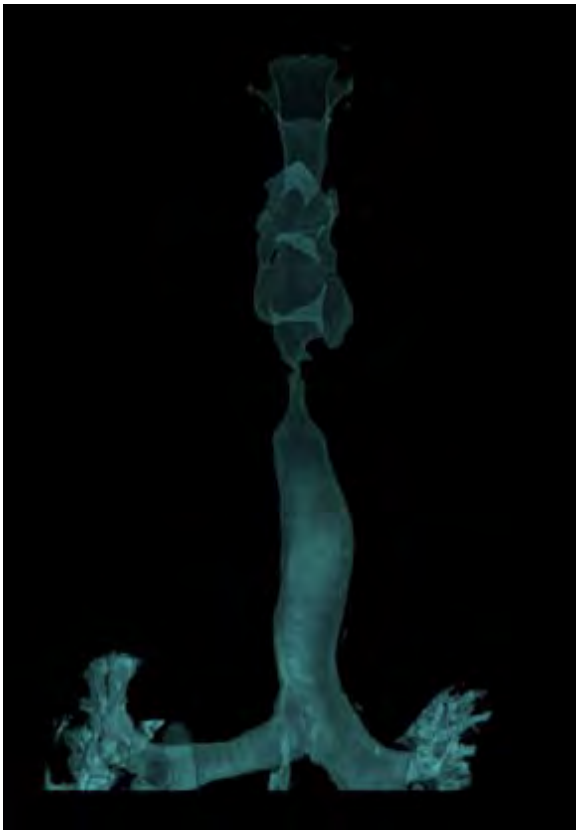
**Background:** We present an experience of fiberoptic intubation for a patient with bilateral arytenoid dislocation and fixation.
**Case report:** A 55-year old woman was scheduled for staging operation for endometrial cancer. She had abdominal surgery history. The anesthesia was induced with propofol 2 mg/kg, rocuronium 0.6 mg/kg, intravenously, and inhalation of 3% sevoflurane was used for maintenance. During intubation with direct laryngoscopy, glottic opening was small. 6.0 mm endotracheal tube was inserted while counterclockwise rotating, but it was only advanced at 18 cm depth of insertion. We cancelled the operation. Consultation was requested to otolaryngologist. Laryngoscopy(fig1) and CT (fig2) revealed bilateral arytenoid dislocation and fixation. Awake fiberoptic intubation was planned. A 5-mm fiberscope was inserted through the left nostril and advanced into the nasopharynx and further down till the epiglottis and vocal cords were visualized. Arytenoid cartilage was dysmorphic and fixed, andl free movement of arytenoid was not shown. Vocal cords were partially abducted. With the cooperative phonation by the patient, fiberscope was gently passed, and 6.0-mm endotracheal tube was inserted over the bronchoscopy. 6 hours of operation was uneventful.
**Discussion:** Bilateral fixed morphology of the arytenoids may impinge endotracheal tube under general anesthesia. Careful history taking and physical examination as well as preoperative laryngoscopy and imaging study are helpful for planning of anesthesia.
**References:** 1. New insights into the pathomechanism of postintubation arytenoid subluxation. Anesthesiology. 1999 ;91:659-66. Paulsen FP

**Learning points:** Bilateral arytenoid dislocation and fixation may be challenging for intubation. Selection of appropriate size of endotracheal tube, fiberscope, and cooperation of patient are important factors for successful intubation.



*[Fig 1]*



*[Fig 2]*

## 13AP05-10

### Sprayed area for topical anesthesia through the working channel of bronchoscope

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**Background and Goal of Study:** Awake intubation using bronchoscope is a well-established technique for patients with an anticipated difficult airway such as receding jaw, and jaw fracture. Topical anesthesia from the pharynx to the trachea, especially around the vocal cords, is important for reducing the noxious stimuli for the patients when awake intubation using bronchoscope is required, since it may attenuate their discomfort and hemodynamic change. In this study, we evaluated the sprayed area for topical anesthesia through the working channel of the bronchoscope.
**Materials and methods:** A bronchoscope (ID: 4.9mm) **(***Pentax FB-15***,** *Pentax* Medicals, Japan) was used for this study. The bronchoscope was placed horizontally 5cm above the desk surface, and the tip of bronchoscope was placed at 2cm apart from the paper wall set vertically. We sprayed water containing an indigocarmine (0.5ml, 1.0ml or 2.0ml) through the working channel (ID: 2.1mm) of the bronchoscope by using three volumes of syringe (5ml, 10ml or 20ml) to force out the water with air. Spray was repeated 6 times for every combination of water volume and syringe (total 54 times). The sprayed area on the wall was measured and recorded. The values are expressed as means±SD. The sprayed area from each groups were compared using the Scheffe test. Differences at $P<0.05$ were considered significant.
**Results and discussion:** The sprayed area using the 5ml syringe with 2.0ml liquid and 3.0ml air was 45±7.4cm$^2$, which was significantly larger than other combinations. In the case of 0.5ml water, sprayed area was 13.6±1.4 cm$^2$ with 5ml syringe, 14.0±2.5cm$^2$ with 10ml syringe and 14.4±2.7cm$^2$ with 20ml syringe. In the case of 1.0ml water, sprayed area was 28.0±2.6cm$^2$ with 5ml syringe, 19.1±0.7cm$^2$ with 10ml syringe and 19.6±3.1cm$^2$ with 20ml syringe. In the case of 2.0ml water, sprayed area was 31.2±3.3cm$^2$ with 10ml syringe and 34.5±4.4cm$^2$ with 20ml syringe.
We have to consider the concentration and total dose of regional anesthetics. However, sprayed area is also important for effective topical anesthesia. The sprayed area may not increase according to the air volume to force out local anesthetics.
**Conclusion(s):** The sprayed area for topical anesthesia through the working channel of the bronchoscope might not be depend on the air volume to force out the local anesthetics. The combination with 5ml of syringe and 2ml of local anesthetics is recommended for effective topical anesthesia for awake intubation.

## 13AP05-11

### Comparison of complications associated with tracheal intubation between anesthesia nurses and anesthesia residents in Japan

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**Background and Goal of Study:** In Japan, the official nurse anesthetist system does not exist. However, in 2010, the master course to train nurses to provide anesthesia services started and, currently, several graduates are practicing clinical anesthesia under the supervision of anesthesiologists (Anesthesia Nurses). The Japanese law does not preclude nurses from performing tracheal intubation provided they are adequately trained, although tracheal intubation has traditionally been performed exclusively by physicians. The purpose of the present study was to evaluate the safety of tracheal intubation by Anesthesia Nurses by comparing the incidence of intubation-related complications between Anesthesia Nurses and anesthesia residents.
**Materials and methods:** A retrospective chart review was conducted in a university hospital from April to October 2015. Our ethical committee approved this study and waived the necessity to obtain informed consent from each patient. Complications associated with orotracheal intubation such as esophageal intubation, tooth injury, bleeding, aspiration and hypoxia were recorded. The number of intubation attempts in each case was also recorded. According to our institutional protocol, Anesthesia Nurses use a video-assisted laryngoscope, while residents are allowed to use whatever devices. The cases handled by Anesthesia Nurses and residents were compared using the Fisher's exact test. A $P$ value $<0.05$ was considered statistically significant.
**Results and discussion:** Two Anesthesia Nurses, both in their 2nd year after graduation from the master course, performed 130 intubations and 9 residents in their 1st to 2nd year of clinical anesthesia training performed 1022 intubations. The number of attempts by Anesthesia Nurses (median 1; min-max 1-2) was significantly less than residents (1; 1-5) ($p<0.05$). The total number of complications by Anesthesia Nurses (2/130=1.5%; 95%CI 0.2-5.4%) was similar to that by residents (35/1022=3.4%; 2.4-4.7%). In the residents group, esophageal intubation occurred in 30 cases (2.9%; 2.0-4.2%), tooth injury in 1 case (0.1%; 0-0.5%), and bleeding in 4 cases (0.4%; 0.1-1.0%). In Anesthesia Nurses group, esophageal intubation occurred in 2 cases (1.5%; 0.2-5.4%), but no other complications were observed.
**Conclusions:** Complications of orotracheal intubation by our two Anesthesia Nurses are no more frequent than those by anesthesia residents.

## 13AP05-12

### Airway trauma after carotid endarterectomy

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**Background and Goal of Study:** Airway compromise after carotid endarterectomy (CEA) is most commonly associated with compression by haematoma and oedema. Laryngeal trauma related to endotracheal (ET) intubation is rare. In this surgery there is an increased risk of airway problems due to intraoperative intravenous heparinization. Hypertension, diabetes and age may also contribute to damage due to microcirculatory compromise. We present a case series of laryngeal trauma related to ET intubation after CEA in symptomatic patients.
**Materials and methods:** Retrospective analysis of data from consecutive patients submitted to CEA between July 2012 and December 2014 in our center. Patients with airway symptoms were identified. Data were collected from medical electronic records including demographics, comorbidities, preoperative airway evaluation, intraoperative variables, postoperative airway symptoms, ENT surgeon fiberoptic evaluation. Descriptive analysis of data.
**Results and discussion:** 151 patients underwent CEA. 2 patients (1,3%) had cervical haemorrage and 11 (7,3%) had cervical hematoma (7 reinterventioned). From these patients, 2 presented postoperative symptoms that were related to ET intubation. Airway trauma directly related to intubation was identified in more 5 patients. A total of 7 symptomatic patients, 4,6%, that were observed by an ENT surgeon. Mean age 70,6 years, 6 with diabetes, all hypertensive. Intraoperative heparine was used in all patients and reversal with protamine in 4. Mean ET intubation time: 134min. Symptoms: dysphonia (6) and foreign body (1).
2 patients had Mallampati grade III, no other predictors of difficult airway. Airway pproach: curve blade in all patients and use of a stylet in 6 patients. All intubations were uneventful.
Vocal cords mobility preserved in 6 patients; not visible in 1 due to haematoma. Laryngeal strauctures haematoma: epiglottis (3); arytenoids (3), aryepiglottis folds (4). Other lesions: epiglottis hyperemia and oedema (1); blood visible in arytenoids (1). Glottic opening compromise due to haematoma protusion (2).
Only 1 patient required continuous antihypertensive drug infusion. No other complications registered.
Airway injuries are potentially serious and may result in adverse events. Anesthesiologists must be aware of the risk of airway trauma in these patients.
**Conclusion(s):** Vigilance of postoperative airway complications after CEA is crucial even after uneventful intubations.

## 13AP06-2

### Tidal volume during general anaesthesia: retrospective analysis of 93509 cases over 5 years - there is still a gender gap!

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**Background and Goal of Study:** Recent studies have shown that large tidal volumes (VT > 10 ml.kg$^{-1}$ of ideal body weight [iBW]) should be avoided during surgery [1]. However, whether and to what extent these results have altered practice remains poorly documented. The university Hospital of Lille, France, has developed a data warehouse allowing analysis of all information contained in the Anaesthesia Information Management System (AIMS). We thus retrospectively analysed ventilation practice at our Institution between 2010 and 2014.
**Materials and methods:** All adults who underwent controlled ventilation during general anaesthesia from January 2010 through December 2014 were included, except thoracic surgery. iBW was automatically computed according to standard formulae. Normalised tidal volumes (VTi) were computed as VT divided by iBW, and separated in four groups: group 1 with VTi<6, group 2 in [6-8], group 3 in [8-10], and group 4 with VTi>10 ml.kg$^{-1}$. Chi2 test with p values <0.05 were considered significant. Results are presented as mean (SD).
**Results and discussion:** A total of 93509 patients were included, aged 51.2 (17.2) yr., 49.7%/50.3% M/F, with a BMI of 26.3 (6.2) kg.m$^{-2}$. Table 1 shows that overall VTi size decreased during the study period. In 2010, only 3.1% of the males, but 19.2% of the females were in group 4. In 2014, this proportion decreased to 0.5% (p<0.001), and 7.8% (p<0.001), respectively. Thus, despite optimization of practices, a "gender gap" (larger VTi in females) persisted in 2014.

| Year | Group 1: M/F | Group 2: M/F | Group 3: M/F | Group 4: M/F |
|---|---|---|---|---|
| 2010 | 390 (5.2%)/ 106 (1.5%) | 3888 (52.3%)/ 1735 (23.9%) | 2924 (39.3%)/ 4017 (55.4%) | 235 (3.1%)/ 1394 (19.2%) |
| 2011 | 500 (5.8%)/ 114 (1.3%) | 4813 (56.5%)/ 2334 (26.1%) | 3024 (35.5%)/ 5029 (56.3%) | 176 (2.0%)/ 1456 (16.3%) |
| 2012 | 535 (5.4%)/ 133 (1.4%) | 6004 (60.9%)/ 2699 (27.4%) | 3178 (32.2%)/ 5634 (57.3%) | 139 (1.5%)/ 1367 (13.9%) |
| 2013 | 665 (6.9%)/ 184 (1.9%) | 6373 (66.0%)/ 3031 (31.0%) | 2533 (26.2%)/ 5456 (55.7%) | 92 (0.9%)/ 1121 (11.4%) |
| 2014 | 907 (8.7%)/ 210 (2.0) | 7713 (73.6%)/ 4147 (39.7%) | 1803 (17.2%)/ 5271 (50.5%) | 55 (0.5%)/ 818 (7.8%) |

*[VTi]*

**Conclusion(s):** These results are in accordance with other recent data [2], and suggest that measures to adequately ventilate female patients should be taken.
**References:**
1. Guay J, Cochrane Database Syst Rev 2015;12:CD011151
2. Bender SP et al. Anesth Analg 2015;121:1231-9

## 13AP06-3

### Tracheal intubation with rocuronium bromide using a "modified timing principle" versus Succinylcholine

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**Background and Goal of Study:** Succinylcholine is the muscle relaxant of choice for Rapid sequence induction (RSI). Rocuronium; a new non-depolarizing muscle relaxant has been considered as an alternative to Succinylcholine in patients where the later drug is contraindicated. The onset of action of rocuronium is shortest among the non-depolarizers, but standard dose of rocuronium (0.6 mg/kg) still takes 60 seconds to achieve adequate muscle relaxation. To curtail down the onset of rocuronium further a novel method of "modified timing principle" has been described.
The goals of our study therefore were to find out whether the "modified timing principle" method when used with Rocuronium would result in acceptable intubation condition, shorter apnea time and lesser complications compared to Succinylcholine.
**Materials and methods:** After taking permission from ethical research committee of our institute, 60 patients during preoxygenation for 3 minutes received 1mg/kg Tramadol and 1mg Midazolam intravenously; and were randomized to receive either 0.6 mg/kg rocuronium followed by 1.5 mg/kg propofol or 1.5 mg/kg propofol followed by 1 mg/kg succinylcholine. The rocuronium group was intubated just after confirming loss of consciousness; the succinylcholine group was intubated once the fasciculations were over and jaw was clinically relaxed. Intubation condition, timing of events and complications were recorded.
**Results and discussion:** All patients were successfully intubated in both groups. Apnea time of the rocuronium group (39.43 seconds) showed statistically significant reduction as compared to that of succinylcholine group(94.73 seconds)(p<0.0001) . No significant differences were observed in induction time or intubation time (p>0.05). None of the patients complained of awareness regarding intubation procedure or had respiratory difficulty during a postoperative interview in both groups. (p>0.05).
**Conclusion(s):** Modified timing principle with rocuronium showed shorter intubation sequence and acceptable intubation conditions as compared to succinylcholine.
**Reference:**
1. Tracheal intubation with rocuronium using a "modified timing principle"Min A Kwon, Jaegyok Song, and Ju-Ri Kim
Korean J Anesthesiology year 2013, volume 64(3), pages 218-222

## 13AP06-4

### Submental orotracheal intubation in surgical interventions on the face

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**Background and Goal of Study:** Major maxillofacial surgery difficulties refer to the problem of necessity of surgeons and anesthesiologists to contact in the same anatomical region. If severe craniomaxillary injuries occur, nasotracheal intubation is not possible, while orotracheal intubation significantly worsens conditions of operation execution and excludes maxillary fixation with facial skull fragments positioning. Tracheostomy is the best choice, however has contradictions. Submental tracheal intubation becomes an alternative method of providing airway patency in patients with maxillo-facial trauma. The key idea is to evaluate the technique of submental orotracheal intubation as the method of airway patency provision during general anesthesia in accordance with the criteria of security and complexity of implementation; to improve the visibility of the surgical field, increase safety and quality of general anaesthesia and choose the best means of airway patency.
**Materials and methods:** The study included 16 patients aged 16-75 years, operated for pathological processes in the maxillofacial area in the period from 2011 to 2014 (76,5% - men, 25,5% - women). First group: in 4 cases we used the technique of tracheal intubation using the fibrobronchoscope through an incision in the submandibular region. Second group: in 12 cases we used the technique of orotracheal intubation of the trachea with subsequent removal of endotracheal tube through an incision in the submandibular region.
**Results and discussion:** Both methods had disadvantages. It was a probability of damage and the ingress of fragments of the surrounding tissues into the lumen of the endotracheal tube. However, in our study, these complications were not identified.
Submental intubation of the trachea in the second group, was technically easier, less time for its implementation was needed, it did not cause additional suffering for the patient. The use of the fibrobronchoscope was not required. Thus, the risk of unsuccessful tracheal intubation in this group was lower.
**Conclusions:** Tracheal intubation through a submental skin incision after normal orotracheal intubation implementation is a safe method for airway patency which facilitates surgical access to mouth and the face middle area, allowing intermaxillary fixation and can be used for patients with maxillofacial injury.

## 13AP06-5

### Unintended right middle turbinectomy during nasotracheal intubation

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**Background:** Nasotracheal intubation was widely used in intra-oral, pharyngeal, laryngeal, also neck surgeries for better visualization. Although nasotracheal intubation can be very useful for orofacial or dental surgery, the technique can be more traumatic than orotracheal intubation with variable reasons.
**Case report:** 19-year-old male with left mandibular angle fracture was scheduled for ORIF. With no skull base fracture, we decided to perform nasotracheal intubation. After induction with propofol, remifentanil, and rocuronium. Right nostril was used to insert the tube, the tube was inserted with some resistance which disappeared after it got into the oropharynx. The patient's cormack grade was I, the intubation was successful without additional try. During auscultation, the breathing sound was really small and inspiratory pressure was more than 40mmHg with no chest elevation. We decided to extubate the tube because mask ventilation was fine with the patient and to find out the problem about the tube. After extubation, mask ventilation was performed with no struggle and in the tube, we could find whole turbinate stuck in the tube. We consulted otolaryngologist to find more injury in the nasal cavity, and we assumed it could be inferior turbinate, which is often injured during nasotracheal intubation. However, it came to be whole right middle turbinate. Epistaxis was found, so we decided to do nasotracheal intubation in right nostril again to give compressive pressure to stop bleeding. Surgery went on with no problem. The patient got discharged 7 days after surgery with no complications.
**Discussion:** After surgery, we found out the patient's nasal septum was deviated to right side. During preanesthetic visit, the patient described that he could breath much better with right nostril, so that was why we decided to perform nasotracheal intubation to right nostril. But facial CT turned out to be nasal septum deviated to right, and turbinates were tightly positioned in the nasal cavity. We need to evaluate the patient's nasopharynx more carefully to avoid this kind of complications.
**Reference:**
A complication of nasotracheal intubation after mandibular subcondylar fracture, J Craniofac Surg. 2011 vol(22);4;1527-9
**Learning points:** We recommend to find out which way nasal septum is deviated before intubation to make nasotracheal intubation more safe and easier.

## 13AP06-6

### Magnet assisted endotracheal intubation as an alternative approach to difficult airway management

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**Background and Goal of Study:** The absence of a universal method or device for successful management of difficult airway stimulates ongoing interest and research on this issue. The main reason behind the difficult airway management failure is impossibility of glottis chink visualization and poor negotiation of the S-shaped anatomical pathway by the tip of endotracheal tube and (or) stylet. The relative unavailability of equipment recommended by DAS algorithms also contributes to the search of practical solutions in developing countries. Our study aimed at overcoming these hindrances by proposing an alternative approach.
**Materials and methods:** Magnet assisted endotracheal intubation technique implies non-invasive access to patient's airway through endotracheal intubation using a specifically designed flexible stylet with movable steel tip. The stylet is introduced into the oropharynx and blindly goes through the glottis chink down the trachea with the help of neodymium magnet D -70-40 (adhesive force 180 kg) placed on the anatomical projection of the larynx. The endotracheal tube is then slid down the stylet into trachea.
**Results and discussion:** The technique was applied in 67 patients, who had a history of failed direct laryngoscopy on second attempt. There were 42 cases of elective surgery and 25 cases of urgent surgery. Difficult airway was anticipated in 49 and unanticipated in 18 cases. 63 patients presented Cormack and Lehane classification grade 3 and 4 patients presented grade 4. Magnet assisted approach was effective in 93% of patients who were successfully intubated on first attempt (48%), second attempt (36%) and third attempt (9%). No specific complications were observed.
**Conclusion(s):** This was a pilot study to examine the feasibility of magnet assisted endotracheal intubation in management of difficult airway. The technique proved to be a safe and cost-effective alternative approach. Yet there is a need for technical improvement such as upgrading stylet steel tip maneuverability and optimal redesigning of the magnet shape. We welcome any bioengineering solutions, expert feedback or critical analysis on our study. Further research might be focused on comparing the use magnet-assisted intubation with other devices.

*[Flexible stylet with movable steel tip]*

## 13AP06-7

### Autoregulatory adjustment range of Cuff-Keeper, a new tracheal tube cuff self-regulatory inflator

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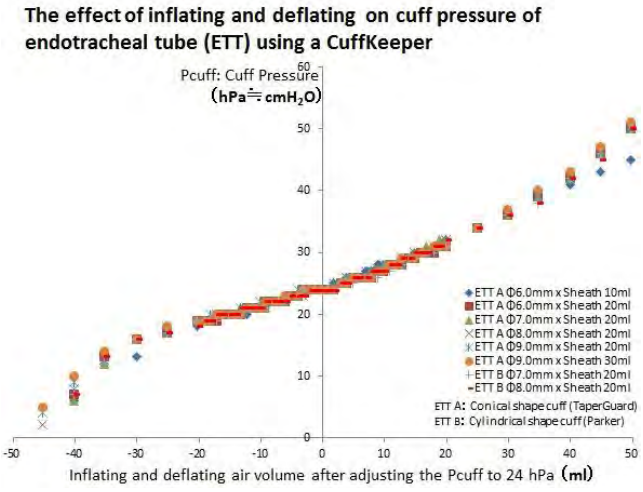
**Background:** To prevent endotracheal tube (ETT)-related complications during ventilation, it is recommended to maintain cuff pressure (Pcuff) within range of 20-30 cmH2O. CuffKeeper (CK; Tokukigikenkogyo, Oita, Japan) is designed to control Pcuff only by handling rotary dial without electricity. This study is to investigate the accuracy and the range of automatic adjustment regulation under simulated plastic tracheal model.
**Methods:**
Phase 1, CK pump pressure validation analysis;
CK was connected to a pressure transducer (TD) directly. Using pump handle static pressure was given to TD from atmospheric pressure with 4 hPa (≒4 cmH2O) increment stepwise fashion to 60 hPa and compared with the value measured by TD.
Phase 2, CK auto adjustment function test;
A syringe and ETT were connected to the experimental system to validate adjustment function by artificially causing leakage and inflation. We tested 2 cuff shapes and 4 sizes of ETTs with 3 sizes of sheath of syringe as the tracheal model. Once Pcuff was set at 24 hPa, auto adjustment function was tested by inflating and deflating air from the system to determine the effective adjustment limit of leakage and inflation.
**Results and discussion:**
1. The values from CK and TD consistently matched. With 30-60 ml of air infusion by a syringe, both CK and TD showed 20-30 hPa which is the appropriate range of Pcuff.
2. We evaluated 8 combinations of ETT size, cuff shape and the tracheal model. Inflation or deflation of 15-18ml air maintained the Pcuff within 20-30 cmH2O and CK showed autoregulatory efficacy of Pcuff at 24 hPa with air inflation/deflation within 2-3ml.


*[An experimental setup and main result]*

Without CK, Pcuff indicated out-of-range value after inflating or deflating only 1-2ml air (P <0.01, vs. with CK, paired t-test). These results support potential usefulness of the CK although it is not capable of holding Pcuff strictly at the same pressure. However, its usability when patients cough and move is unclear, which requires further studies to conclude clinical usefulness and limitations of this device.

**Conclusion:** CuffKeeper, which is easily operated with manual handle without electricity, is potentially an effective device for achieving appropriate Pcuff.

## 13AP06-8

### Right lobar selective ventilation in a patient with previous left upper lobectomy by DLT (VivaSight DL) and Arndt bronchial blocker

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**Background:** Lung collapse is required for thoracic surgery in order to facilitate the surgery, being the double-lumen tube (DLT) the preferred technique. A valid alternative is the insertion of a bronchial blocker in the main bronchus of the lung which will undergo surgery1-2. This case was exceptional since the combination of both techniques was required3.

**Case report:** A 75-year-old woman and ASA III was scheduled for a right middle lobectomy. She had a history of a left upper lobectomy and wedge resection of the left lower lobe. The preoperative respiratory function tests showed a FVC 86.8%, FEV1 77.1%, FEV1 / FVC ratio of 0.73 and DLCO 82.4%. A 37Fr left DLT (**VivaSight DL)** was inserted without incidences but at the beginning of the collapse of the non-dependent lung, this patient presented a severe SpO2 decrease and hypercapnia with high peak airway pressures. After optimal DLT position was confirmed by fiberscope we decided to start upper right lobe ventilation and we introduced a 7Fr Arndt bronchial blocker guided by fiberscope into the right intermediate bronchus through the DLT tracheal lumen. In addition, a 5 cmH2O CPAP was subsequently applied to the middle and lower right lobes to improve oxygen saturation. Finally, the patient was extubated in the operating room. Afterwards, this patient was transferred to the ICU for a 24 -hour period without further incidents and she was discharged from hospital five days later.

**Discussion:** The ventilation of patients undergoing thoracic surgery who have previously suffered another side lung resection can be very difficult, but these difficulties cannot always be foreseen. Therefore, different alternatives need to be provided in order to maintain intraoperative oxygenation and ventilation. One of them is that presented in this case: a combined use of a left TDL and a bronchial blocker in the right intermediate bronchus.

**References:**

1. Kaza SR, Maddali MM, Albahrani MJ, et al. Indian J Anaesth.2012; 56:567-9.
2. Ng JM,Hartigan PM. Anesthesiology. 2003; 98:268-70.
3. McGlade DP, Slinger PD. Anesthesiology 2003; 99 (4):1021-2.

**Learning points:** The presence of normal preoperative pulmonary function tests of both lungs is not enough to predict intraoperative oxygenation and ventilation difficulties in cases like this one. Moreover, different ventilation options such as lobar ventilation and/or CPAP application on lung surgery must be provided in these cases by the use of bronchial blockers and/or TDL.

## 13AP06-9

### Acute airway compression by expansive thoracic aortic aneurysm: an anesthesiologist's diagnosis

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**Background:** Thoracic aortic aneurysm can rarely lead to airway compression[1,2], which is usually revealed by computed tomography/magnetic resonance imaging (CT/MRI scans)[3]. In this case report, it was discovered by the anesthesia team during a diagnostic work-up of an acute obstructive respiratory failure.

**Case report:** A 51 years old male patient was scheduled to undergo a two-stage procedure for correction of a thoracic aortic aneurysm: a carotid-left subclavian artery bypass first, and after one week, an endovascular correction. The first procedure was uneventful. However, on post operative day (PO D) 7, the patient developed acute respiratory failure. Cervical hematoma with airway compression was first suspected. After intubation in the ward, the patient was taken to the operating room for surgical exploration. However, ventilatory pattern was unsatisfactory, with very high end tidal CO2 levels and also high peak inspiratory pressures. Hypoxemia sudden developed despite adjustments on the anesthesia ventilator. At this time, an emergencial traqueostomy (TQT) was performed, but obstructive ventilatory pattern persisted. A flexible bronchoscopy was introduced through the TQT by the anesthesia team, which identified an extrinsic pulsatile tracheal compression by the aneurysm. The vascular surgery team was contacted, who promptly made the aneurysm correction with endoprothesis. The procedure was successful and soon afterwards the patient ventilatory status greatly improved. After intensive care unit admission, he was eventually discharged to the ward on the PO D20.

**Discussion:** This case illustrates an acute airway compression which evolved to respiratory failure, likely due to an acute expansion of a thoracic aortic aneurysm. The recognition of this condition is crucial and is usually made by diagnostic CT/MRI scans. In this case, the diagnosis was made by the anesthesia team through flexible bronchoscopy, ultimately leading to the emergency intervention by the vascular surgery team.

**References:**

1. Koomen E, Schurink GWH, Mochtar B et al. J Cardiothorac Vasc Anesth 2007;21(1):88-90.
2. Kumeda H, Tomita Y, Morita S, et al. Ann Thorac Surg 2005;79:1038-40.
3. Mori M, Chuma R, Kiichi Y, et al. J Cardiothorac Vasc Anesth 1993;7(5):579-594.

**Learning points:** The diagnosis of the tracheal compression was made by the anesthesia team and was crucial for its rapid correction and for the patient outcome.

## 13AP06-10

### What should be noted in anesthetic management of patients who require surgically achieved hemostasis after undergoing head and neck surgery?

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**Introduction:** Head and neck surgery is associated with potential life-threatening risks, because the surgical site is close to the respiratory tract. Notably, postoperative bleeding can lead to a critical situation, thus anesthetic management should be performed very carefully for obtaining surgical hemostasis. To investigate perioperative events, we retrospectively reviewed the records of patients who underwent otolaryngology surgery and selected those who experienced post-surgical bleeding, which requires a procedure to obtain hemostasis under general anesthesia.
**Methods:** The records of all patients who underwent otolaryngology surgery at our institution from 2008 to 2015 were assessed. We noted surgery details, postoperative hemorrhage incidence, time until re-operation, anesthetic methods, and postoperative management.
**Results:** The study population consisted of 4812 patients (tonsillectomy 967, thyroid surgery 86, submandibular gland surgery 35, others 3724). An additional surgical procedure under general anesthesia in order to obtain hemostasis was necessary in 13 cases (0.3%), including 9 (0.9%) following tonsillectomy, 3 (3.5%) following thyroid surgery, and 1 (2.9%) following submandibular gland surgery. As for the time until re-operation, hemostasis was performed after few hours in 2 of the tonsillectomy cases, while that was done from 4 to 13 days after the operation in the other 7 due to secondary bleeding. In all thyroid surgery and submandibular surgery patients, hemostasis was achieved within 24 hours.
Regarding anesthesia in these cases, 2 thyroid surgery patients were intubated in the ward, indicating that a critical constriction had occurred in the upper respiratory tract with internal bleeding. 7 were intubated without the use of a muscle relaxant and 2 were intubated using a fiberscope. Some induction times were long in post-tonsillectomy bleeding (e.g. 17, 44min), which indicated external bleeding in the pharynx interfered with the view.
In addition, 8 patients were transferred to the ICU with a tracheal tube used to secure the airway.
**Conclusion:** Airway narrowing caused by internal bleeding requires more rapid airway management for hemostasis in cases with bleeding following post-thyroid surgery and post-submandibular surgery. In patients with external bleeding causing sight impairment, an appropriate method to secure the airway opening, such as that used for maintaining spontaneous breathing in post-tonsillectomy bleeding, is necessary.

## 13AP06-11

### Who is afraid of AFOI?

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**Background and Goal of Study:** Awake fiberoptic intubation (AFOI) seems to be best choice of succesfull intubation for oral cancer surgery. The aim of the study was to estimate the patient comfort and memory recalls associated with nasal AFOI.
**Material and method:** In accordance with ethic authorities regulation in clinical audit 42 patients scheduled for oral cancer surgery and AFOI were enrolled. RFNT TCI plasma effect 2-3ng/ml was performed 10 min before start nasal fiberoscopy together with topical nose and pharynx anesthesia. Midazolam 2mg <65y and 1mg >65y and nasal oxygen 6 $L \cdot min^{-1}$ were provided. Standard monitoring with BIS was applied.
Ventilation and hemodynamic parameters: heart rate, systolic artery pressure, mean artery pressure, diastolic artery pressure, pulsoxymetry, end-tidal $CO_2$ and BIS value were recorded at defined time points. At the start of TCI [1], fiberoscopy [2] and an hour after anesthesia [3] simple picture was showed and number (1-10) was told. Limb movement, grimacing, coughing, verbal reaction and sedation was assessed.
Next day hemodynamic parameters, memory recalls (pictures and numbers), comfort level and willingness for AFOI again were estimated.
**Results:** 42 patients (9 women and 33 men), mean age 61, BMI 23,6, ASA I - III with Mallampati: 1- 9(21%), 2- 12(29%), 3- 9(21%), 4-12(29%) and mean thyromental distance 7cm were enrolled in the study. 8 pts got the atropine 0,08mg/kg becouse of bradycardia following TCI.
Mean time from start fiberoscopy until intubation 4min ± 1,5. Mean anesthesia time 433min.

| | Start TCI | Start fiberoscopy | Intubation | Surgery beginning | 1 h after anesthesia |
|---|---|---|---|---|---|
| HR [beat/min] | 72 ± 10 | 81 ± 12 | 91 ± 12 | 80 ± 10 | 85 ± 13 |
| SBP [mmHg] | 140 ± 17 | 128 ± 22 | 127 ± 24 | 125 ± 23 | 130 ± 17 |
| MBP [mmHg] | 105 ± 11 | 97 ± 14 | 96 ± 15 | 95 ± 15 | 95 ± 14 |
| DBP [mmHg] | 79 ± 7 | 76 ± 11 | 75 ± 11 | 76 ± 12 | 71 ± 10 |
| SpO2 (min-max) | 97 (94-100) | 98 (93-100) | 98 (88-100) | 99 (97-100) | 98 (92-100) |
| BIS | 93 ± 3 | 86 ± 6 | 77 ± 12 | 50 ± 9 | ---- |

*[Physiologic variables (mean value ± SD)]*

Recorded during AFOI: cough - 34(81%), grimacing (mainly with nasal input) - 32(76%), hands movement - 14(33%), verbal reaction (comments) - 4(10%).
Next day patients' recalls of picture [1]: 36(86%) and picture [3]: 37(88%) but picture [2]: 10(24%).
Similarly: number [1]: 25(60%) and number [3]: 23(55%) but number [2]: 3(7%). None patient reported any complaints and all felt comfortable and expressed willingness for AFOI next time.
**Conclusion:** Although during AFOI patients present symptoms of discomfort, complaints or distress there are no negative memories or concerns for AFOI.

## 13AP06-12

### Subglotic tracheal stenosis - another challenge for us

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**Background:** Subglotic tracheal stenosis (STS) is a rare but dangerous condition which symptoms mimic asthma, congestive hearth failure and COPD. In most cases, the STS is due to prolonged intubation or tracheostomy. The patients are often presented in emergency departments with inability to breath and complain suffocation.
**Case report:** hereby we report three cases who ware orthopneic, bet-ridden with complained suffocation.
***Case 1:*** 38yrs.old male, with severe (grade IV) according Cotton-Mayer classification, rigid short-segment (1,5-2,0cm) STS. He was successfully managed with laryngeal mask airway (LMA) and while maintaining of spontaneous breathing, tracheal resection and primary anastomosis were performed.
***Case 2:*** 32yrs.old female with undiagnosed Riedel Thyroiditis was presented in emergency department with complains of suffocation. Severe (grade IV) rigid and long-segment (4,5cm) STS was observed. Under critical conditions, the patient was successfully managed with LMA maintaining spontaneous ventilation. During unsuccessful attempts to perform tracheostomy, accidental pneumothorax was created by the surgical team, the patient deteriorated quickly. After successful intubation (ETT 4,0) tracheostomy was created.
***Case 3:*** 11mo.old girl was presented in emergency department with severe (grade IV) rigid in depth but with soft surface STS due to recurrent viral laryngotracheal papillomathosis. The patient was managed with LMA, through distal port of which flexible laryngotracheoscopy was performed and under apneic conditions laser surgery was performed.
**Discussion:** In most cases of severe STS tracheostomy is performed under local anesthesia, but sometimes other airways plans are to be used. By using LMA acceptable ventilation parameters-oxygenation and minute ventilation-are achieved at the expense of $CO_2$ elimination and high Paw. Gastric distension, nausea and vomiting were not observed. All three patients did well and were discharged from the hospital.
**References:**
1. Huskonen A et al. Duodecim; Laaketieteelinen Aikakauskiria 2015; 131(19):1793-801
2. Liu et al. Journal of cardiothoracic Surgery(2015) 10:148
**Learning points:** LMA is not worse option than ETT; it is safe and easy option for severe rigid STS in elective and even in emergency cases.

# Patient Safety

## 14AP01-1

### Neostigmine induces depolarising neuromuscular blockade and muscle weakness in awake healthy volunteers: a randomized placebo controlled double blind trial

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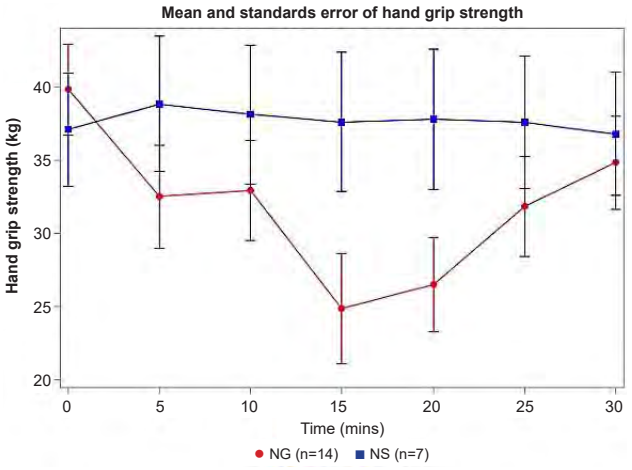
**Background:** Neostigmine reverses shallow non-depolarizing neuromuscular blockade. However, when administered after full recovery of the neuromuscular function, clinical doses may cause muscle weakness.
We hypothesised that a reversal dose of neostigmine decreases maximum voluntary grip strength (primary) and twitch height (secondary endpoint) in healthy, awake volunteers.
**Methods:** 21 Volunteers were randomised to receive up to two doses of intravenous neostigmine 2.5 mg and glycopyrrolate 450mcg (NG, n=14) or normal saline (NS, n=7). Hand grip strength, twitch height (T1) and train-of-four ratio (TOF) were measured every 5 minutes and the t-test applied.
**Results:** The maximum reduction in hand grip strength from baseline in the NG group occurred at 15 minutes (mean -14.9kg, SD 8.5), which was significant compared with the placebo group (mean +0.5kg, SD 6.3) (p=0.0003).
Twitch height continued to decrease over the duration of the study. At 30 minutes, the reduction in T1 from baseline in the NG group (mean -29.1%, SD 18.0) was significant compared with the placebo group (mean -1.4, SD 7.6) (p=0.0001), while TOF-ratio did not change.
Those receiving neostigmine with glycopyrrolate became obvious, to the participants and research personnel, within the first five minutes, symptoms of fasciculations, dysphagia, nausea, abdominal pain and visual disturbance were reported.
There were no significant differences in demographics between the study groups. The mean dose of neostigmine received by participants in the NG group was 56.9μg/kg (standard deviation [SD] 15.8).
The maximum reduction in TOF from baseline in the NG group also occurred at 15 minutes (mean -2.1%, SD 7.7), but this was not significant compared with the placebo group (mean +0.3%, SD 1.0) (p=0.2668).




*[Figure 1. Hand Grip Strength]*

**Conclusion:** Neostigmine administration to volunteers with full neuromuscular function caused muscle weakness that showed the characteristics of a depolarising neuromuscular blockade.
The neuromuscular blockade induced by neostigmine will not be identified using TOF monitoring, when the monitoring is instituted after the administration of neostigmine, because no fade is produced.

## 14AP01-2

### Single dose Teicoplanin for prophylaxis in major joint arthroplasty decreases drug errors; Patient safety improvement project

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**Background:** Drug errors are a key performance indicator of quality in patient care. Our existing antibiotic (ABX) prophylaxis guidelines which consisted of Flucloxacillin 1 gram IV QDS or Teicolplanin 400mg IV BD (depending on renal function & penicillin allergy) plus Gentamicin 160mg IV OD on induction showed low rate of drug errors.
A single dose of Teicoplanin (800mg) & Gentamicin (160 mg) administered on induction had proffered advantages.[1]
**Material and methods:** Teicoplanin 800mg IV (or 600mg or 400mg for patients weighing 40-50Kg or less than 40Kg, respectively) plus Gentamicin 160mg was approved for microbiological efficacy in primary lower limb joint arthroplasty by UKOMS (United Kingdom Orthopaedic Microbiology Service) and King George Hospital, BHR NHS Trust. This gained further approval at the Quality Governance and Assurance meeting. A prospective audit of patients' outcome was conducted for two months and a comparison was made with a matched cohort which underwent treatment in accordance with the existing ABX prophylaxis policy. The primary outcome was the number ABX-related errors.
**Results:** No ABX-related errors were reported in the single dose ABX group. Four patients had reports of drug errors in the multi dose limb. The difference was significantly less in the single dose cohort compared to the multi-dose cohort (p=0.046). Secondary outcomes were not significantly different in both groups (Table 1).

| | Multi-dose ABX (n=36) | Single dose ABX (n=47) | p |
|---|---|---|---|
| Age (years) | 68.1 ± 10.7 | 68.6 ± 10.1 | 0.82 |
| Weight (Kg) | 83.0 ± 17.5 | 81.7 ± 17.3 | 0.75 |
| Body Mass Index | 29.6 ± 4.9 | 29.7 ± 5.3 | 0.97 |
| ASA (I/II/III) | 2/27/7 | 1/38/8 | 0.84 |
| Number of ABX-related errors | 4 | 0 | 0.046 |
| Number of patients with postoperative Surgical Site Infection | 0 | 0 | 0 |
| Number of patients that required additional ABX postoperatively | 2 | 3 | 0.87 |
| Number of patients that developed Acute Kidney Injury | 3 | 1 | 0.31 |

*[Demographics and outcomes, values are mean±SD]*

**Conclusion:** A single dose of Teicoplanin (800 mg) and gentamicin (160 mg) administered on induction decreases risk of perioperative drug errors. It is non-inferior to multi-dose ABX prophylaxis in terms of microbiological coverage with an additional direct cost saving of £4.96 per patient. Further ongoing audit is underway with the intention of examining rate of Acute Kidney Injury.
**Reference:**
1. Kanellakopoulou K, Papadopoulos A, Varvaroussis A, et al. Efficacy of Teicoplanin for the prevention of surgical site infections after total hip or knee arthroplasty. *Int J Antimicrob Agents* 2009;**33**:437-40.

## 14AP01-3

### Drug related critical incidents reported by Spanish anaesthesia and reanimation incident reporting system. A review

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**Background:** Medication critical incidents (CI) are common in Anaesthesiology and Critical Care fields, most of them preventable and potentially dangerous for patient safety. Incident reporting systems are useful tools in order to improve safety in healthcare. Our principal goal was to get certain knowledge of critical incidents reported by Spanish Anaesthesia and Reanimation Incident Reporting System (SENSAR) related to medication errors.
**Case report:** Review of all analyzed and closed medication CI reported by SENSAR from January 2007 to December 2015. In this time-frame, 405 CI have been classified by analyzers as related to medication errors. 63,9% have been closed and corrective measures have already been taken. 48,39% took place in the operating-room, 16,9% at the hospitalization floor, 15.3% at critical care units and 10.4 % at anaesthesiology consultation rooms. Medication CI are less common in labor or X- ray rooms, or remote locations from operating rooms.
The most common reported drugs related to medication CI were: opioids (11.5%), low molecular weight heparines (9.16%), sugammadex (8.3%), antibiotics (8.3%), catecholamines (7.5%), muscle relaxants ( 4.38%), others (3.19%). The emergence of sugammadex in this list could be due to the new implantation of this drug in Spain.
According to the moment they occur we found that 38.4% took place during administration, 18.8% at the time of prescription, 13.2% during preparation and 11.2% at the moment of delivery.
Referring to morbidity: 61% did not present harm; 17 % minor morbility; 10% medium morbidity; and 5% resulted in cancellation of surgeries. We found major morbidity in 1.59% with two reported deaths, only one of them related to the CI.
The measures performed were aimed to disclose CI: 35.5% were presented in clinical sessions, 29.1% in local meetings, 13.7% enable immediate email warnings, 3.6 % set off new protocols or modifications in the previous ones (6.2%), 2.9% suggestions for professional training.
**Discussion:** Local corrective measures are the most common ones, as happen in other CI reporting systems. We agree with other authors in: Most of reported drug related CI take place at the moment of drug administration; opioids and heparins are one of the most common drugs involved in medication CI; SENSAR allows us to pool CI at national level, share common warnings and aids to improve safety culture in healthcare.

## 14AP01-4

### Implications of fluidotherapy in radical prostatectomies

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**Background and Goal of Study:** Perioperative fluid management and its influence on postoperative complication and patient outcomes in general is a crucial aspect in our daily clinical practice as anesthesiologists.1 The aim of this study is to analyze the implications of the fluidotherapy in the outcome of patients undergoing radical prostatectomy (RP).
**Materials and methods:** Retrospective analysis of patients undergoing RP in a central hospital during 2014. The variables analyzed were: the type and the amount of fluid administered during surgery and its implications in transfusion rates, variation of hemoglobin and creatinine between admission and discharge, days of hospitalization, biochemical recurrence and mortality. Statistical analysis was performed using SPSS Statistics® 23, percentages were used for categorical variables, mean with standard deviation (SD) or median with quartiles for nominal variables, depending on normality. The Kruskal-Wallis, Mann-Whitney U, Qui-squared tests and Spearman's correlation were performed according to the characteristics of the variable and considered statistically significant a p-value<0.05.
**Results and discussion:** In total 114 RP were performed. The variation of hemoglobin was related in a statistically significant way, to the type of fluids administered (p=0.017), the amount of crystalloids (p=0.013) and colloids (p=0.013). Blood loss varied significantly with the type of fluids administered (p=0.001). The variation of creatinine was related significantly to the type of fluid (p=0.027), the amount of crystalloid (p=0.022) and colloids (p=0.007). Intraoperative fluids administration did not significantly influence the days of hospitalization or mortality. The amount of administered crystalloid was significantly correlated with the value of post-operative prostate-specific antigen (PSA) (p=0.011) and the need for transfusion (p=0.009). The amount of administered colloids, was not correlated significantly with the value of PSA (p=0.298) and with the need for transfusion (p=0.056).
Less aggressive intraoperative fluid management might lead to a shortening of the length of hospitalization as well as an amelioration of the patients' clinical outcome.1 Although colloid administration is said to prolong length of hospitalization, there was no evidence of this in our study.1
**Conclusion(s):** A standardized and more restrictive fluid management might be beneficial in patients undergoing RP.1
**Reference:**
1. BMC Anesthesiology2014;14:61

## 14AP01-5

### Cardiac arrest after neostigmine administration

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**Background:** The case of a 42-year-old male who suffered cardiac arrest after neostigmine and atropine administration at the end of urogenital operation, is presented.
**Discussion:** After diagnosis of pyelonephritis, operation was planned for the 42-years-old, 80 kg male patient. Pre-operative there were no abnormal lab results. History and physical examination were also normal without known cardiac anomaly. In the operating room, standard monitorisation was performed with electrocardiography (ECG), SpO2 and non-invasive blood pressure. ECG was completely normal. Heart rate was 90 beats/minute, SpO2 was 98%, and NIBP (Non Invasive Blood Pressure) was 100/70 mm/Hg. After two minutes of preoxygenation, anaesthetic induction was given with 2mg midazolam, 200 mg propofol, 100 mg lidocaine, and 100 mcg fentanyl. In order to facilitate endotracheal intubation, 50 mg rocuronium bromide (IV bolus) was given. Intubation tube 8.0 number was inserted. Anaesthesia was maintained with 2% sevoflurane in 50-50% O2-air gas mixture. During the operation, heart rate was between 90- 80 beats/min, NIBP was between 80/60-100/75 mmHg, SpO2 was between 97-99%, and etCO2 was between 32-41 mmHg. No pathological changes were recorded. Surgical operation continued for 45 minutes. At the end of the operation, sevoflurane was terminated and the patient was ventilated with 100% O2. Neuromuscular blockage was reversed by neostigmine 40-45 $\mu$g/kg and atropine 15-20 $\mu$g/kg doses. At this stage, ECG heart rate was 90 beats/min, NIBP was 110/70 mmHg, SpO2 was 97%, and etCO2 was 40 mmHg. Without any other cardiac arrhythmias, bradycardia and consequently asystolic arrest was observed. Chest compression was started and according to new resuscitation guidelines, 100 mcg adrenaline (IV) was given every 3 minutes. At the 10th minute of cardiopulmonary resuscitation, sinus rhythm was recovered. Spontaneous ventilation was sufficient, but his conscious was not observed. The patient was taken to the ICU. The next day his conscious was observed and he was extubated. Then he was transferred to urology wards.
**Learning points:** There is literature available suggesting that neostigmine and atropine administration may be associated with arrhythmias and cardiac arrest. Anesthesiolog must be careful when uses this drugs.

## 14AP01-6

### Real drug incompatibility: precipitation of thiopental due to use of labetalol in rapid sequence induction-intubation of preeclampsia patient

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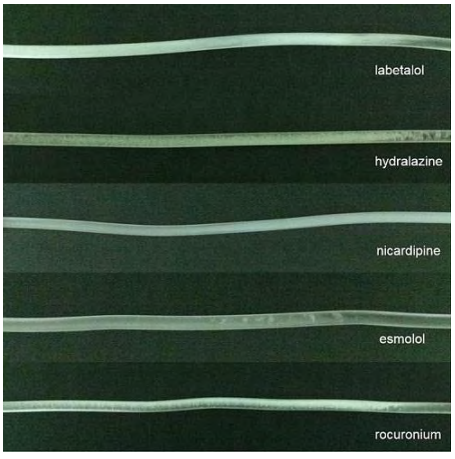
**Background:** Precipitation of thiopental by muscle relaxants such as rocuronium is a well-known phenomenon.[1] Precipitate is a result of reduced solubility of thiopental by adding acidic muscle relaxant solution. However, there is a possibility of precipitation with any acidic drug solution like labetalol (pH 3.0-4.5) with basic thiopental solution (pH 8.5-10.5).
**Case report:** A 31-year-old female (weight, 58.5 kg; height, 163 cm; ASA class 3) was scheduled for emergency cesarean section due to severe preeclampsia. General anesthesia with rapid sequence induction-intubation was planned. Blood pressure in operating room were over 200 mmHg. At the beginning of induction, 10mg of labetalol bolus was injected twice to minimize escalation of blood pressure and thiopental was given in short interval. Soon after that, white precipitation was observed and clogged the line. A new IV line was promptly established on the other hand, and 50mg of rocuronium was administered immediately. Intubation was successful. Surgery and recovery were also unremarkable.
**Discussion:** Thiopental is weak acid and it is soluble in water only if the pH is greater than 9.90, so the drug solution is basic; likewise labetalol is weak base which is much soluble. Inceased pH by labetalol solution make thiopental not soluble and precipitate.
The pH of commonly used antihypertensives and its mixing tests were conducted.

| Calcium channel blocker | Nicardipine | pH 3.5 |
|---|---|---|
| | Nimodipine | pH 6.0 - 8.0 |
| ß adrenergic antagonist | Esmolol | pH 4.5 - 5.5 |
| | Labetalol | pH 3.0 - 4.5 |
| Hydralazine | | pH 3.4 - 4.4 |
| Nitroglycerin | | pH 3 - 6.5 |
| Opioids | Fentanyl | pH 4 - 7.5 |
| | Remifentanil | pH 2.0 - 3.5 |

*[drug pH (from pharmaceutical company)]*




*[Mixing test: precipitate formation]*

Dense yellowish precipitate is observed with hydralazine.
**References:**
1. Chambi D, Omoigui S: Precipitation of thiopental by some muscle relaxants (letter). Anesth Analg 1995; 81: 1112
**Learning points:** It is important to pay special attention in use of acidic drug solution with basic drug solution. Free-flowing drip of fluid and generous saline flush can minimize the potential danger.

## 14AP01-7

### Green anaesthesia

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**Background:** One of the greatest accelerated threats to global health is environmental change. This review explores the impact of anaesthetic practice on the environment. We should consider whether our care has contributed to the destruction of a society elsewhere. At the time of this review, world leaders at the UN Climate Conference are committing unilaterally to achieve a model of growth that is safe, durable and beneficial to all. Anaesthetics should be no different.
**Materials and methods:** Articles were selected by a Web of Science literature search. The MeSH terms used were Anaesthesia, Climate, Environment and Global warming. The search was limited to the last 5 years.
**Results and discussion:** The WHO recognises health's environmental impact and states hospitals have a responsibility to make healthcare sustainable.
Volatiles used in anaesthesia contribute to 0.02% of the raised $CO_2$ attributed to climate change and contribute to the greenhouse effect[1].
Desflurane is the most environmentally damaging gas, requiring the highest therapeutic dose and strongly resisting degradation, with an atmospheric lifetime of 8.9 years. Desflurane's reputation has led to a historical decision by a leading hospital; the withdrawal of a drug due to environmental impact[2].
Anaesthesia is a heavy user of disposable items, a change driven by seminal infection scares. But would reusable equipment suffice and cut costs and waste? The comparative environmental and human health impacts showed re-useable masks are at least half as damaging in all but 2/10 categories[3].
**Conclusions:** Green Anaesthesia advocates the removal of $N_2O$ and Desflurane, use of low flow volatiles, TIVA and reusable equipment as a mainstay. These recommendations chime with modern anaesthetic currents of practice sanctioning the Anaesthetist to abide by his principles for nature and man. When the abundance of hospital waste is weighed against other sectors we will be forced to change and lay risk to arbitrary sanctions from governments.
We must unite as a profession while we have the choice to make environmental savings that maintain patient safety.
**References:**
1. Sulbaek Anderson MP et al. Inhalation anaesthetics and climate change. Br J Anaesth 2010 105:760-6
2. Ryan SM1 et al Global warming potential of inhaled anaesthetics: application to clinical use. *Anesth Analg.* 2010;111(1):92-8
3. Eckelman M, et al. Comparative life cycle assessment of disposable and reusable laryngeal mask airways, *Anesth Analg* 2012,114:5; 1067-72

## 14AP01-8

### The experimental comparison on the fluid warming performances of the Ranger™, ThermoSens®, and Mega Acer Kit® according to flow rates and distances

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**Background and Goal of Study:** Perioperative hypothermia is a recognized and common side effect of anesthesia, which inhibits normal thermoregulation. Therefore, the guideline recommends that intravenous fluids with volumes >500 ml should be warmed to 37°C using a fluid warming device. The changes in the temperature of the delivered fluid can be influenced by the device-specific maximum flow rate as well as the outflow tubing length from the warming device.
We conducted to compare the fluid warming performances of Mega Acer Kit®, which is designed for warming the fluid via the lumen of the heated circuit, with Ranger™ and ThermoSens® according to flow rates and distances.
**Materials and methods:** We set Mega Acer Kit® (group M), Ranger™ (group R) and ThermoSens® (group T) according to the manufacturers' instructions and infused fluids, which had been stored in the operating room over the previous 24 hr, using infusion pump at sequent flow rates 440 ml/hr, 650 ml/hr, 860 ml/hr, 1140 ml/hr and fully dropping state.
We simultaneously recorded fluid temperatures at the inlet point and two outlet points [76 cm (proximal) and 166 cm (distal) from each device] every 1 min

for 10 min after the 10 min of equilibration period between each infusion rate. We repeated each test eight in each device.
**Results and discussion:** The temperature at inlet point showed no significant differences among the groups. At a flow of 440 ml/hr, the temperature of proximal outlet point was significantly higher in group M (34.3 ± 1.1°C) compared with group R and T (29.3 ± 0.8°C and 30.4 ± 0.1°C, p <0.05). However, it was significantly lower than that of group R and T at 1140 ml/hr and fully dropping state (37.8 ± 0.4°C and 36.7 ± 0.1°C, p <0.05). The temperature of distal outlet point also showed the similar results with more significant decrease (p <0.05), except at fully dropping state in group R and T (37.2 ± 0.2°C and 36.0 ± 0.1°C).
**Conclusion(s):** We suggest that for effective warming cold fluid, Mega Acer Kit® is suitable at lower flow rate below 860 ml/hr, whereas ThermoSens® and Ranger™ is suitable at higher flow rates above 1140 ml/hr with less than 76 cm of outflow line.
**References:**
1. Anaesthesia. 2006;61:571-5.
2. Anesthesia and analgesia 2004, **99**(3):788-792.
3. J Anesth. 2015 Aug;29(4):499-507.

## 14AP01-9

### Improving safety on the usage of local anaesthetics among surgery residents in a tertiary university hospital

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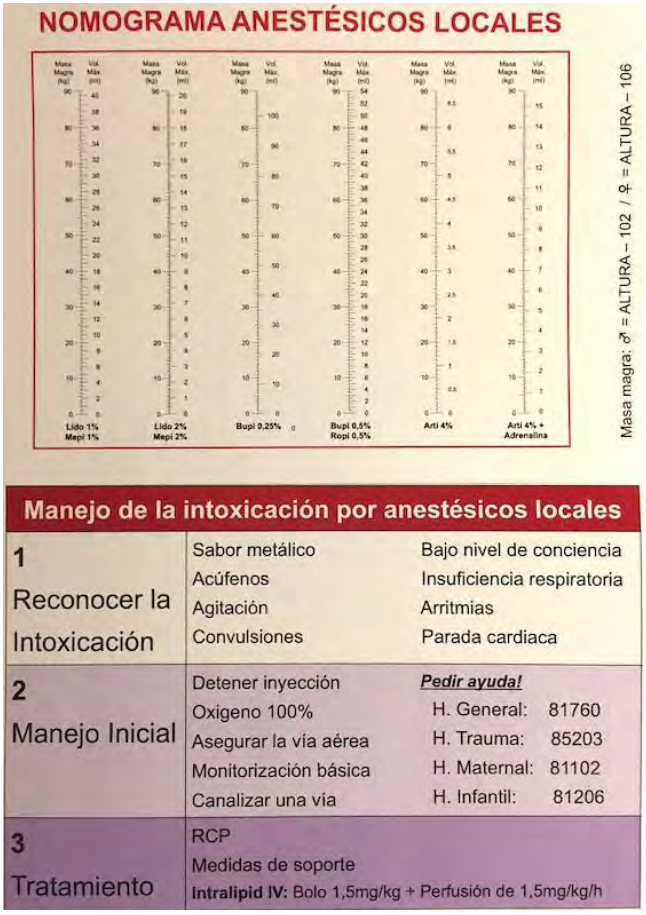
**Background:** Local anaesthetics (LA) are commonly used by surgeons. Our aim was to assess the knowledge of surgery residents (SR) concerning LA use, and to teach them how to calculate the maximum recommended doses of LA with a nomogram (figure) as a way to reduce the risk of LA toxicity and thus improve patient safety.
**Methods:** We developed a nomogram to calculate maximum doses (mg/kg and ml/kg) of LA (lidocaine, mepivacaine, bupivacaine, chirocane and articaine) based on ideal body weight. We performed a survey based on a questionnaire proposed to SR who use LA regularly. We assessed rate of use, knowledge on maximum doses, clinical signs toxicity and immediate management.
Finally, we asked SR to calculate the maximum dose of 2 LA (lidocaine & bupivacaine) using their prior knowledge and using the nomogram. We analyse data using $X^2$, p<0.05 was considered significant.
**Results:** 40/40 distributed questionnaires were collected. SR ranked their knowledge on LA with a 3.0±0.7 3[1-5] on a Likert Scale. 34/40 used LA more than once week and 13/40 daily, mainly in the emergency department (23/40); 34/40 did not monitor patients and 6/40 used pulse-oximetry or EKG.
25 used mepivacaine, 6 articaine, 5 bupivacaine, 4 lidocaine but none chirocane. 39/40 knew that a maximum dose existed, however 28/40 didn't knew it for lidocaine and/or bupivacaine.
30/40 identify metallic taste as a first symptom, however only 18/40 properly new the clinical setting.
2/40 had seen LA intoxication before and 34/40 knew whom to call in case of one.
Concerning what they considered the specific treatment 12/40 knew about intralipid®, but: 8 answered oxygen, 6 naloxone and 9 didn't answer. When asked to calculate the maximum dose for a 70kg patient, 4/80 doses were calculated correctly without nomogram, which increased to 65/80 at the first attempt using the nomogram, p<0.00, RR 0.06 (0,02-0,16).
**Conclusions:** As anaesthesiologists, it is our duty to educate on medication safety, especially when it is been use in areas outside the operating room and with little to no monitoring.
The nomogram we developed improved the LA dose calculation, and is now on every SR's pocket in our hospital.



*[Figure: LA Nomogram]*

## 14AP01-10

### Perioperative management of the new oral anticoagulants: are Portuguese General Practiotioners aware of the Portuguese Society of Anesthesiology Consensus?

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**Background and Goal of Study:** In Portugal, it's usual for patients to approach General Practitioners (GPs) with questions regarding the perioperative management of the new oral anticoagulants (NOA) prior undergo endoscopic procedures or minor surgeries. Regarding the best practices and patients welfare, the Portuguese Society of Anesthesiology (PSA) released the 2014 Consensus on perioperative management of anticoagulants/antiaggregants. We aimed to assess the knowledge of a group of Portuguese GPs and trainees regarding this important field of their practice.
**Materials and methods:** In a GPs meeting, we requested volunteers to fulfill a questionnaire comprising 2 groups of questions related to the perioperative management of NOA. In the first group of questions participants were asked to differentiate surgeries with no, minor or high risk of bleeding. In the second group, they were asked to answer true or false to 8 pharmacology related questions regarding the perioperative management of NOA. Data related to the level of training and the previous knowledge of the Consensus were collected. Participants were divided in three groups: specialists, trainee within their first 2 years of training and senior trainees. Descriptive and inferential statistics were performed using SPSS v.20.0.
**Results and discussion:** A total of 30 GPs and trainees answered our questionnaire (11 GPs, 5 trainees within first 2 years, and 14 senior trainees). Only 3 (10%) had read the PSA Consensus. Regarding the risk stratification surgeries: 40% only identified correctly ≤4 surgeries and 70% to ≤6. Similar scores were recorded for the pharmacological aspects of the NOA, with 43% answering correctly to ≤4 questions and 90% to ≤6. No significant differences were found between the different groups (p=.057 for pharmacology; p=.468 for

surgeries: using Kruskal Walis test). These results reflect the lack of awareness of GPs regarding the relevant document issued by the PSA, with <50% of the participants answering correctly to half of the questions.
**Conclusion:** Safety and welfare of patients using NOA is a major concern and valid instruments as the PSA Consensus statement can help to standardize procedures among health professionals, and raise the quality of their practice. Both GPs and Anesthesiologists should actively cooperate in order to spread the awareness among clinicians usually engaged in the perioperative management of NOA.
**Reference:**
Rev Soc Port Anestesiol 2014;23(3)76-93

## 14AP02-2

### Anaesthesia data warehouse: opportunities for confronting theory and reality

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**Background and Goal of Study:** Anaesthesia Information Management System (AIMS) captures all information, clinical and administrative, from the pre-operative assessment through the intraoperative period to discharge from the post-operative care unit. These data could be reused for clinical research, improvement of quality of care and decision support.
However, collected data high volume and heterogeneity render immediate analysis impossible, so that they must be integrated into a data warehouse (1). Once cleaned and aggregated thanks to rules provided by expert clinicians, these data can be synthesized in order to provide meaningful and useable information.
**Materials and methods:** The University Hospital of Lille in France has integrated data from the AIMS and a billing system into a data warehouse since 2010. Various processes enable cleaning, deduplicating records, assessing manual entries and heterogeneous formats, and then relate relevant data together. Integrated data are then aggregated or even used to compute new data that help analyse specific periods of interest during surgical procedures, detect adverse events, compute the total amounts of drugs administered or evaluate patient outcomes.
**Results and discussion:** During the 2010-2014 period, data from 276 812 interventions related to 2 377 129 hospital stay and 175 214 patients have been integrated into the data warehouse. Recordings of 1 545 582 585 physiological measurements as well as the 43 314 015 events that occurred during anaesthesia can be analysed, and more than 300 specific indicators have been computed for each case: e.g. duration of surgery, total amount of propofol, time spent with mean arterial pressure lower than 60 mmHg, mean arterial pressure during anaesthesia, duration of hospital stay and whether intensive care was required.
The data warehouse offers the possibility to retrospectively query data related to more than two hundred fifty thousand anaesthesia procedures. Cases can be selected according to various parameters (e.g. period of time, type of surgery, patient characteristics). Occurrence of peroperative adverse events can be related to patient outcome. Continuously fed with data routinely collected, the data warehouse will integrate data from more than 50 000 new interventions each year.
**Reference:** 1. Nunez CM. Advanced techniques for anesthesia data analysis. Semin Anesth Perioper Med Pain. 2004 Jun;23(2):121-4

## 14AP02-3

### Simple electronic tools to improve recognition of those most at risk: the way forward?

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**Background and Goals:** Comorbidity is “the presence of more than one disease/condition present in the same person at the same time.” Recognising Co-Morbid Conditions (CM) accurately is key to directing appropriate care and resources to those most at risk, a task faced every day by Emergency Departments (ED).
In the UK, CM is an element in the ‚tariffs’ claimed by hospitals- an essential element of their revenues.
Incomplete coding of CM skews important indices such as Summary Hospital Mortality Indicators (SHMIs), a measure of the crude mortality rates- the bench marking tool used by the UK Department of Health.
An Electronic Search Tool (ST) was developed by one of us in conjunction with our Information Technology team. This tool searches across the various admin/clinical/non clinical databases held by the organisation, output being limited to 10 years. The information retrieved includes abbreviated notations of hospital/clinic attendances, admission episodes, admitting specialities, allergies recorded and investigations ordered.
**Materials and Methods:** The survey looked at patients admitted from our hospital ED between 2200 and 0600 hrs, over a 2 week period in Sep/Oct 2014. The time (2200-0600 hrs) was chosen as the period when support levels were low.
ED electronic records were queried for the comorbidities recorded. The handwritten ED records were scrutinised by one of us as well to confirm the same. The ST was also queried about the same patients, using their NHS numbers (a unique number for each UK citizen) as unique identifiers.
**Results and Discussion:** 121 records were selected, with a 9% drop out rate due to incomplete ED records.
In total, the ST identified 463 CM across the entire group, while the ED records listed 171 CMC. The average number of CMC’s was 3.86 per patient.
There were 292 instances when a CMC was recorded on the ST but not on the ED records and 22 where the ED had more information.
ST was particularly effective at picking up Cerebrovascular and Renal conditions.
The use of traditional history taking tools in this acute scenario in clinically high risk cases seems to be missing a significant number of co morbid conditions.

## 14AP02-4

### The feasibility of the use of tablet-type device to facilitate the better understanding of the anesthesia practice at the preanesthetic clinic for informed consent

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At our hospital, all operation cases are being examined by the preanesthetic clinic before received the anesthesiology. The group explanation is being performed about general information related to anesthesia (anesthetic way, the kind of monitors and complications) before a medical examination for efficiency. However, recently pointed out the possibility of the group explanation isn’t always effective of temporal restrictions and efficiency. Therefore, preanesthetic clinic patients divided into 2 groups, the explanation was offered with by an anesthesiologist (oral group) and using a tablet-type device (device group), and the intelligibility was compared and considered.
**Method:** After approval of an ethics panel in our hospital, we studied the patients undergoing elective operation. A date for 1 month which was an investigation period is shared with oral group and device group by the table of random numbers.10 questions of questionnaire test was performed after the explanations of each. A question was the basics answered by a YES or NO, and these 10 scores were compared and examined.
**Result:** Target patients for 1 month were 387, and effective answers were 333 (86.0%). There were no significant differences in 174 oral group, 160 device group, the age ( average 56.1 years old and 54.0 years old) and the gender

(77 mail and 97 female: 78 mail and 82 female). The number of average of the questionnaire test is not significant difference of 9.61 oral group and 9.41 device group by Man Whitney U test.
**Discussion:** It's necessary to explain basic information related to anesthesia in all cases, on the other hand it'll be a serious work to repeat the same explanation for all the patients in preanesthetic clinic doctors. There are also hospitals where the most part of explanation televises a video or on a DVD, but its intelligibility isn't considered. When using a tablet-type device, it is necessary to operate the device according to the progress of explanation contents, and expected a possibility that patient's concentration continues. The intelligibility even with the explanation by the oral is confirmed, it would be possible to improve efficiency and advantage convenience by using a tablet-type device.
**Conclusion:** The use of tablet-type device to explanation of the anesthesia practice at the preanesthetic clinic for informed consent, equal understanding was obtained than by an anesthesiologist oral presentation.

## 14AP02-5

### The effectivity of end-tidal CO2 and oxygen reserve index (ORI) monitoring to detect respiratory events before pulse oxymetry in sedation: a preliminary report

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**Background and Goal of Study:** Pulse oximetry monitoring and oxygen supplementation are used to manage hypoxaemia during sedated endoscopy. Despite its widespread use, the measurement of SpO2 has been reported to have limited utility. Current clinical guidelines recommend capnography as one of the best non-invasive methods to assess adequacy of ventilation in sedated patient. However, supplemental oxygen results in increased alveolar oxygen partial pressure despite the presence of hypoventilation. Oxygen Reserve Index (ORI) is a relative indicator of the partial pressure of oxygen in arterial blood (PaO2) in the range of 100 to 200 mmHg.ORI may enable to serve as an early alarm of changes in patient's oxygen status. In this study we aimed to show effectivity of capnography and ORI monitoring to avoid respiratory events and hypoxia in sedated endoscopic patients.
**Materials and methods:** In this study we targeted totally 300 sedated endoscopy patients. With IRB approval and written consent, a total of 150 patients were enrolled so far. On arrival at the endoscopy unit, the patient's medical history and records were obtained. Adult size O2/CO2 nasal cannula (Nomoline™ sampling line, Masimo Corp, USA.) were attached. Pulse oximetry, ETCO2, ORI (Masimo root monitor), non-invasive blood pressure and ECG monitoring were used in all patients and patients were randomised to two groups. In Group I anesthesiologist was able to use all the monitoring, where as in Group II was blinded for ETCO2 and ORI. Study protocol was, applying sedation just after O2 supplementation (5L/min via nasal cannula) at the outset. After review of 8 patients we observed that ORI is 0 for all and rise in ORI values was not enough to show the changes between groups. Therefore we determined to apply preoxygenation to show the difference and to obtain long safe apnea time. Afterwards we used approximately 5 min preoxygenation to reach steady state in oxygen reserve. Propofol boluses were used for sedation. We defined hypoxemia; SpO2 <95% and severe hypoxemia SpO2 ≤90%, hypoventilation; rise10 mmHg in ETCO2 compare to baseline and ETCO2 ≤30 mmHg.
**Results and discussion:** The key finding of this study is marking necessity of preoxygenation in sedation. We also observed low ORI levels in blinded group and early decrese in ORI compare to SpO2.
**Conclusion(s):** ORI seems have ability to be a new, non-invasive, useful monitoring for non-intubated patients.

## 14AP02-7

### Sharps safety audit in operating theatres

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**Background:** Healthcare workers in operating theatres (OT) are exposed to the risk of sharps injury. Such injury can lead to sepsis, blood-borne infections and has psychological, medico legal and financial implications [1]. To minimize and manage these risks Health Boards produce policies. In our health board sharps awareness training is mandatory.
**Goal of Study:** To evaluate sharps safety training and knowledge of theatre staff.
To assess the use of sharps bins in OT complexes.
**Materials and methods:** An audit was undertaken at Nevill Hall Hospital in all the three OT complexes.A questionnaire consisting of nine questions based on the hospital policy [2] was used to assess
1.Current training.
2.Knowledge of sharps handling.
3.Sharps injury management.
Further observation of the types, placement and fullness of sharps bins were carried out.
**Results:** 102 theatre personnel took part in the survey.
Knowledge:
67% had received training.
44% correctly identified the types of sharps bins and their purpose.
86% knew the correct method of disposing of sharps.
63% knew the correct method of disposal of IV giving sets.
48% knew all the 5 steps to be taken in managing a sharps injury.
67% knew whom to contact.
Practice:
Of Non medicinal, Medicinal and Cytotoxic sharps bins, only medicinal sharps bins were provided in our OTs.
70% of the bins were incorrectly placed e.g. on the floor.
30% were overfilled.
**Discussion:** Significant numbers of our Healthcare workers had not received mandatory training and there were gaps in their knowledge. There were inadequacies in the provision of appropriate sharps bins, their placement and filling.Following this audit the cytotoxic bins and sharp bin trolleys are available in OT complexes and staff have been educated not to overfill bins. The audit will be presented locally to increase sharps safety awareness.
**Conclusion(s):** Our audit highlighted a deficit in training and knowledge of sharps disposal and injury management. It also identified the lack of correct sharp bin types, placement and usage prompting rectifying measures.
**References:**
1. http://www.independent.co.uk/news/pounds-465000-for-doctor-left-with-phobia-after-needle-injury-1177131.html
2. http://www.wales.nhs.uk/sitesplus/866/opendoc/270442

## 14AP02-8

### Attitudes and use of cognitive aids during anaesthetic crises in Sweden: an electronic survey

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**Background and Goal:** Written or computerized resources designed to reduce human errors when tasks are being performed are called "cognitive aids" (CA's). CA's can consist of checklists or algorithms presented in various formats. International associations have produced and published collections of CA's for use during anaesthetic crises but there is at present no such Swedish equivalent. Despite CA's for anaesthetic emergencies being intuitively attractive, there is an absence of large clinical trials evaluating their effectiveness: the only hard evidence supporting their use is from simulation-based studies (Marshall et al. 2013).
The aim of this study was to describe attitudes towards, the distribution and use of CA's for anaesthetic crises in Sweden. This study is part of a bigger project within the Swedish Society of Anaesthesia and Intensive Care (SFAI) with the ultimate goal of creating and implementing a national Swedish collection of CA's.

**Method:** Folliwing ethical approval, an electronic survey was constructed using Google Forms(c). The survey was sent by email to all members of SFAI. Pearson's Chi-squared test was conducted to test categorical data and the Kruskal-Wallis-test and Wilcoxon's rank sum-test were used to analyse continual data that were collected in order to investigate attitudes towards CA's.
**Results and discussion:** The distribution and use of various CA's for anaesthetic crises is homogenous and widespread in Sweden. Both their availability and use improve subjective medical outcomes, and Swedish anaesthetists generally have a positive attitude towards CA's. Departmental CA's are most commonly available on hospital intranets (workstation computer based) and are thus not always optimally suited for use in crisis-situations. Given the cultural acceptance of CA's in Sweden we suggest that the creation and implementation of a national collection of CA's for anaesthetic crises would improve patient care. This should be made available in both paper form and as a smartphone app.
**Conclusions:** In Sweden, anaesthetists' attitudes towards CA's are generally positive and we have shown that CA's have the potential to subjectively improve medical outcomes. We conclude that there is a clear need for a national Swedish collection of CA's for use in anaesthetic crises.
**Reference:**
1. Marshall S. The use of cognitive aids during emergencies in anesthesia: a review of the literature. Anesthesia and analgesia. 2013;117(5):1162-71.

## 14AP02-9

### The WHO surgical safety checklist: improving use

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**Background and Goal of Study:** The WHO surgical safety checklist improves compliance with safety standards and decreases complications from surgery. It was introduced at the Royal Free Hospital in 2010. In 2011 an audit of 520 patients over 3 weeks (15/4/11-6/5/11) revealed poor compliance (57% complete; 6% not started). Although several serious untoward incidents highlighted the potential benefits of using the checklist compliance remained poor. The aim of this audit was to improve use of the WHO checklist.
**Materials and methods:** The key stakeholders within each theatre team were identified and surveyed informally. The key reasons cited for the failure to complete the WHO checklist were; lack of understanding, perceived lack of time and overall lack of communication, co-ordination and defined responsibility. Education on the checklist was delivered to theatre staff. Thereafter various initiatives were implemented using plan, do, study, act (PDSA) cycles to gauge their effectiveness. After each intervention the effect was assessed by a spot audit of 50-100 patients over a week.
**Results and discussion:** In October 2011 a spot audit of 50 patients over a week found that utilisation of the checklist was still low (67% complete). Repeating the 50 patient spot audit unexpectedly detected a fall in use of the checklist (50% complete). The greatest deficiency was in completion of the surgical time out. However, highlighting this to theatre staff and allocating responsibility for the sign in, time out and sign out to the anaesthetists, surgeons and circulating scrub staff respectively resulted in an improvement (100 checklists; 94% complete). However this was unlikely to be sustained without the repeated audits which could not be continued indefinitely. Of the many initiatives that were tried, the most successful was to refuse access to the theatre recovery area without a complete checklist. A month later a spot audit of 100 patients found that the WHO checklist had been completed for all cases. Subsequent spot audits have confirmed that this improvement has been sustained.
**Conclusion(s):** Despite clear evidence of benefit of the WHO surgical safety checklist human factors still limited use this checklist. The ‚stick' philosophy of refusing entry to the theatre recovery area without a complete checklist was the key to its successful implementation at our institution.

## 14AP02-10

### Retained clamp after correct surgical counting: when risk factors count

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**Background:** Retained surgical items (RSI) are preventable never events that can result in patient morbidity, legal liability or increased health-care expenses. The reported incidence is 0.3-1.0 per 1000 operations. A recent meta-analysis reveals 7 RSI risk factors, including intraop blood loss >500 mL, duration of surgery, >1 subprocedure, lack of surgical counts, >1 surgical team, unexpected intraop factors and incorrect surgical count. Changes in staff, emergency surgery, body-mass index, and operation "afterhours" were not significantly associated with RSI risk.[1,2]
**Case report:** A 44 year-old male was admitted to emergency room with a bullhorn injury. Primary evaluation revealed penetrating injuries to the left upper quadrant with evisceration of stomach and small bowel. Emergent exploratory laparotomy was done under general anesthesia. General surgery team performed splenectomy and vertical gastrectomy and then the thoracic surgery team ended thoracic exploration and closure.
Through total 5 hours surgery the 8 am shift change for nursing and anesthesia staff occurred. Surgical instrument counting was documented as correct. Blood loss was estimated in 800 mL. ICU recovery was uneventful. Control CT scan at 48h only remarked a surgical clamp inside abdominal cavity. Clamp removal was uneventful.
**Discussion:** We report a RSI case in a surgery with an overall RSI high risk profile despite correct surgical instruments counting. In fact, the stated sensitivity of this method in preventing these events is only 77 %.[3] RSI risk stratification is crucial so that complementary preventive strategies (surgical counts, radiographic verification, radiofrequency labeling of instruments and sponges) can be individually tailored. Further research is required to validate a new RSI risk score and to evaluate the impact of specific preventive measures.
**References:**
1. Moffatt-Bruce SD et al. J Surg Res. 2014;190:429-36.
2. Hempel S et al. JAMA Surg 2015;150(8):796-805.
3. Egorova NN et al. Ann Surg. 2008;247(1):13-8.
**Learning points:** A RSI is a surgical patient safety problem. It is a serious reportable event in UK and US, whose prevention requires practice change, knowledge, and shared information between all perioperative personnel. Surgical RSI risk stratification should be included in checklist in order to adequate preventive strategy. A multidisciplinary approach and paradigm shift inside the operating room is critical to turn a "never event" into a "never happen event".

## 14AP02-11

### The - more than surgical - safety checklist. A pilot study on the feasibility, reception and clinical relevance of an INTRA-operative amendment to the WHO Surgical Safety Checklist

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**Background and Goal of Study:** The WHO Surgical Safety Checklist has had profound impact on patient safety. However, it is a tool developed by surgeons for surgeons and has an exclusive focus on peri-operative aspects. We postulate the expansion of the checklist's beneficial agenda to all phases of surgical procedures and present a novel 10-item INTRA-operative checklist to cover the dynamics of an operation and thus provide a balanced view of surgical and anaesthesiological considerations.
**Materials and methods:** We presented a provisional checklist (containing over 30 candidate items) to anaesthesiologists during three consecutive major surgical procedures, precisely 90 minutes after first incision and documented all answers to our checkpoints. Strict confidentiality resulted in a surprise effect in round one and comparable learning effects for all participants till round three.
Later participants were able to evaluate a final revised 10-item checklist and were interviewed regarding their safety attitudes.
**Results and discussion:** 86 participants provided 63 complete triplets of investigations. Time requirements for our extensive preliminary checklist were moderate (73% less than 3 minutes at third round). At evaluation only 16%

(n=14/86) of all participants found feasibility difficult and a majority of 71% (61/86) thought positive about a new intraoperative checklist, 71% (61/86) believed in an actual safety benefit and 78% (67/86) would welcome the use of the checklist would they undergo surgery themselves. In our sample we seldom, but repeatedly detected human and logistical factors as possible safety issues. All 10 final check items earned majoritarian positive evaluations regarding their probable clinical relevance.

Check 1: Vital sings, alarms, equipment functioning?

Check 2: Any complications on any side?

Check 3: Resources of man-power, equipment, medication, vascular access?

Check 4: Intake/Output? Infusion running (TIVA)?

Check 5: Bleeding and Coagulation: Diagnostics? Components?

Check 6: Temperature?

Check 7: Positioning?

Check 8: Post-OP care?

Check 9: Know your surroundings: How can you reach help? (Nurse, Consultant)

Check 10: State of surgery? Make contact now!

*[The novel INTRA-operative Checklist]*

**Conclusion:** We demonstrate the feasibility, clinical relevance and positive reception of a concise 10-item INTRA-operative safety checklist to amend the existing WHO version and advocate it's repeated use (e.g. every 60 minutes) during major procedures.

## 14AP03-1

### Indicators of safety in continuous epidural analgesia: a prospective analysis in 2 phases

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**Background:** The Helsinki Declaration on Patient Safety in Anesthesiology recommends using protocols to manage postoperative care. We aimed to analyze:
1) the continuous infusion epidural analgesia (CIEA) process to provide an evidence base for our protocols to improve patient safety and
2) analyze the effect of the protocols in terms of process and quality indicators.
**Material and methods:** Prospective study in 318 patients receiving CIEA for acute pain after nonobstetric surgery (1st phase May 2012-April 2013), when we studied processes and variables that could serve as indicators of safety in relation to epidural catheter (EC) placement, quality checks, and incidents. After analysis we proposed changes in our protocols and studied their effect (2nd phase April 2014-March 2015). In both phases we recorded age, sex, body mass index (BMI) and time the EC was in place. The following quality indicators were evaluated:
a) inserting/securing the EC according to the anesthetist's training level and number of placement attempts;
b) quality checks (double-checking items on a CIEA checklist, labeling the perfusion system, recording dosage); and
c) incidents (error in route of administration [epidural *vs* intravenous]; early removal or EC escape, or system disconnection; and complications).
Results were analyzed as percentages and compared with the $\chi^2$ test.
**Results:** Age, sex, BMI, and time the EC was in place were similar in the 2 phases. In the 1st phase there were significantly more incidents and complications when residents participated ($P=0.002$), more than 3 EC placement attempts ($P=0.05$) and there tended to be fewer EC escapes or system disconnections with opaque dressings ($P=0.05$). In the 2nd-phase (309 patients), there was better compliance on list double-checking and fewer EC placement attempts (>3 attempts on fewer occasions). Results in the 2 phases are compared.

| Indicators | 1st phase | 2nd phase | P |
|---|---|---|---|
| R3-R4 puncture/ R1-R2 puncture | 21.5%/ 18.7% | 32.3%/ 12.6% | 0.003/ 0.039 |
| Opaque dressing | 62% | 84% | <0.001 |
| List double-check | 80.3% | 88.7% | 0.006 |
| Dosage error(indicated vs administered) | 11.5% | 4.7% | <0.001 |
| Proper labeling | 65.3% | 94.4% | <0.001 |
| Escaped ECs or disconnections | 13.2% | 7.4% | 0.013 |

*[Table 1]*

**Conclusions:** In the 1st phase, we were able to identify processes and indicators that are potentially related to CIEA complications.
The 2nd-phase implementation of a protocol based on 1st-phase findings led to improvements in the safety and process indicators.

## 14AP03-2

### Implementation of safe strategies decreased incidence of errors in the clinical practice of patient-controlled analgesia in postoperative patients: a retrospective study

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**Background:** Intravenous patient-controlled analgesia (IVPCA) offers meaningful advantages over traditional analgesia for postoperative pain. Strategies for decreasing human errors are critical because IVPCA errors can be catastrophic. We aimed to examine whether implementing safe strategies decreased the incidence of errors in clinical IVPCA practice.
**Materials and methods:** A retrospective study was conducted at a Medical Center (2005~2012). The acute pain service team including anesthesiologists, pain nurses and pharmacists provide PCA service. Four safe strategies have been implemented since Nov. 2006, including:
1. to centralize, dispense and label each PCA bag appropriately;
2. to use a single, standard concentration for each PCA drug;
3. to use level-based standard PCA prescribing and pump programming and
4. to implement an independent double-check of all PCA procedures.
Pain severity at rest/on movement, patient satisfaction and side effects of IVPCA during the first three postoperative days were examined and recorded electronically by acute pain service team members in every visit for each patient.
All data was stored in the electronic, computerized hospital system. An 11-point numeric rating pain scale was used for assessing the pain severity. Patient satisfaction was determined by the 5-point Likert scale. Fisher exact test was calculated to compare the incidence of errors before- and after- the four safe strategies.
**Results and discussion:** A total of 13,508 IVPCA patients were enrolled in this study. The incidence (1/12,003) of wrong drug concentration in after-group was significantly lower than that (3/1,505) in before-group ($p=0.001$). The incidence (2/12,003) of wrong programming in after-group was significantly lower compared to that (3/1,505) in before-group ($p=0.006$). There were no significant differences in pain score and patients' satisfaction between groups. Overall, the results revealed that the four safe strategies reduced the incidence of human errors effectively.
**Conclusion:** Implementation of the four safe strategies for the PCA practice can minimize the risk of human errors effectively. To standardize physicians' orders by using level-based standard PCA prescribing and pump programming did not affect the efficacy of pain relief and patients' satisfaction. Whichever prescription is utilized, the overall safety and success of PCA usage rely on the expert supervision of nurses and anesthesiologists in an acute pain service.

## 14AP03-3

### A Multistep protocol designed and implemented to reduce errors in drug handling and their administration in anesthesia: a clinical audit

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**Background:** Medication error is any preventable event that may cause or lead to inappropriate medication use or patient harm.The estimated rate of drug errors is reported to be around one error in every 133 anaesthetics.In order to reduce drug handling related errors, we devised a four step protocol in our department.
1) The identity of the drug will be confirmed by two persons, at least one of them being the anaesthesia doctor who is going to administer it. The drug will be drawn in the syringes labelled with colour coded stickers.
2) A receptacle will be placed in each or at the commencement of each case, all used ampoules will be kept in this receptacle. This will help to identify the drugs administered during the case if drug error is suspected in a case.
3) All drugs are kept in their packs in the operating room as well as in the pharmacy. The ampoule will only be removed from the pack when the drug is to be withdrawn into the syringe.
4) All filled syringes will be discarded at the end of the case. Fresh drugs will be drawn for every case.
**Goals of Study:**
-To look for compliance of drug handling protocol among residents and consultants.
-To compare the incidence of errors related to drug handling before and after the implementation of drug handling protocol
**Material and methods:** Compliance of the protocol was checked by data analysis of 2 years data from 5000 anaesthesia record forms of three hospitals of Lahore.Number of critical incidents related to drug error in our hospitals was checked 2 years before and 2 years after the implementation of drug handling protocol from our critical incident registers.
**Results and discussion:** Compliance of drug handling protocol following was found to be improved from 81.5% to 85% on an average among residents and from 73.4% to 85.3% among consultants from year 2014 to year 2015.After the implementation of drug handling protocol in our department, incidence of drug related errors was found to be reduced from 0.06% to 0.04% (p-value = 0.3196 and Odds Ratio=1.499). Majority of drug errors were related to wrong drug administration (42%) and wrong dose administration (21%) both before and after the drug handling protocol implementation.
**Conclusion:** We suggest an addition of a step in departmental protocol that there should be a second "two person check" at the time of administration of drugs.Incorporation of drilling sessions and maximum reporting of drug errors will help reducing drug errors and will improve patient's safety.

## 14AP03-4

### DASh and slash: race to improve patient safety

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**Background and Goal of Study:** The 'can't intubate, can't oxygenate' (CICO) scenario is a well-recognised life-threatening anaesthetic emergency[1]. The new Difficult Airway Society 2015 guidelines promote surgical cricothyroidotomy as the final 'Plan D' strategy for CICO management and also highlight the importance of human factors[2].
Our audit aimed to assess the impact of introducing a standardised, prepacked surgical kit to reduce the time taken to collect individual instruments for a surgical cricothyroidotomy. We also canvassed our anaesthetic colleagues regarding their views on these packs and their preferred CICO strategy.
**Materials and methods:** Operating department practitioners (ODPs) were asked to collect equipment required to perform a surgical cricothryoidotomy under timed conditions. A pre-packed surgical airway kit was then introduced and ODPs were retimed on collection. We also surveyed members of our anaesthetic department, asking about their preferred 'Plan D' airway technique[2] and to appraise the contents of the new surgical pack.
**Results and discussion:** Prior to the introduction of the surgical kit, the median time taken by ODPs to collect the necessary equipment was 65.5 seconds (interquartile range (IQR), 50.75-132.5 seconds). With the introduction of the new pack, median time was reduced to 37 seconds (IQR 34 - 67 seconds). Our survey revealed 85% of our colleagues agreed entirely with the core components of the pack. However, less than 50% would choose a surgical cricothyroidotomy as their preferred "Plan D" for a CICO scenario. In particular, less than 10% of anaesthetic consultants preferred this option, despite the new DAS guidelines advocating this strategy[2].
**Conclusion(s):** Our audit demonstrates the clear potential of a dedicated surgical airway pack in improving efficiency in CICO management. In future, we plan to deliver a focused education programme to improve awareness of the pack amongst all staff working in environments where anaesthesia is delivered. To address the issue of aversion towards performing surgical cricothyroidotomy, we aim to organise a workshop for our department to practise and improve their confidence with this technique.
**References:**
1. Cook TM, Woodall N, Frerk C; on behalf of the Fourth National Audit Project. Br J Anaesth. 2011;106(5):617-31
2. Frerk C, Mitchell VS, McNarry AF, et al. Br J Anaesth. 2015;115(6):827-48

## 14AP03-5

### Audit of revised Major Haemorrhage protocol awareness and equipment levels in a new Glasgow hospital: a rapid improvement event

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**Background and Goal of Study:** The effective management of massive haemorrhage is a key capability for any anaesthetic department (1).
The British Committee for Standards in Haematology have identified several reasons why hospitals fail to achieve standards of care, including inadequate training and awareness of local protocols and untimely collection of blood samples and components (2).
An established Major Haemorrhage protocol was revised for use in the new Queen Elizabeth University Hospital theatre department in May 2015. This audit aimed to assess awareness of the new protocol and appropriate equipment levels in theatres, as part of a rapid improvement event.
**Materials and methods:** A baseline snapshot audit was performed in June 2015. Staff in 13 working theatres were asked if they had read the new protocol. The number of theatres with the minimum required levels of equipment were recorded in 19 theatres. Results were discussed with the Anaesthetic Sister and recommendations implemented including staff training on the protocol and regular checks on the adequate supply of equipment in each theatre by anaesthetic assistants. Three months later an unannounced audit of equipment levels was undertaken.
**Results and discussion:** 64% (18/28) of trained nursing staff and 70% (16/23) anaesthetists had read the protocol. The protocol was displayed in 95% of anaesthetic rooms and 95% of theatres (18/19). Theatre equipment levels at baseline and at re-audit are shown in table 1.

| Equipment | Baseline (%) | Re-audit (%) |
|---|---|---|
| Crossmatch forms | 32 | 47 |
| Full blood count bottles | 95 | 63 |
| Coagulation bottles | 79 | 84 |
| Crossmatch bottles | 95 | 68 |

*[Results of baseline audit and re-audit. n=19]*

**Conclusion:** Staff awareness of the new protocol was evaluated in the baseline audit to guide training on the subsequent new protocol familiarisation. Equipment levels in theatres were variable and implementation of the initial recommendations did not improve this. Therefore, we recommend a Major Haemorrhage trolley, as a source of equipment which can be checked and restocked regularly and rapidly brought to the appropriate theatre. This is currently in development.
**References:**
1. Blood Transfusion and the anaesthetist: Management of Massive Haemorrhage, AAGBI 2010
2. Guidelines on the management of massive blood loss. British Committee for Standards in Haematology Writing Group. Br J Haematol. 2006;135:634-641.

## 14AP03-6

### Anaesthetic record keeping: consent

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**Background and Goal of Study:** We regularly audit anaesthetic record keeping using RCoA standards. Of particular interest is consent. Consent requirements have become more stringent following a landmark Supreme Court judgement. A Doctor is required to take "reasonable care to ensure that the patient is aware of *any material* risks involved in any recommended treatment".[1] This is in line with GMC recommendations.[2] Specific anaesthetic risks and frequency are printed on our anaesthetic chart, and changes in consent were discussed at a departmental meeting. We expected to find consent to include all listed risks, even if rare.
**Materials and methods:** We carried out a retrospective review of 30 patient notes over a 24 hour period. The proposed standard was 100% documentation of discussion of all listed anaesthetic complications.
**Results and discussion:** Documentation of consent was poor - recorded in 66.6% (20/30) and only partially covering the list of ‚anaesthetic risks'. Discussion possibly takes place but is not documented. This may be caused by time constraints in an overpressured service, or habit. It is challenging to discuss risks in full for fear of distress, refusal of surgery, and subsequent harm. However it is no longer accepted practice to disclose only "what this patient would regard as relevant"[3] or adopt a "paternalistic" medical model. A patient-centred approach allows the patient to "weigh up the potential benefits, risks and burdens of the various options"[3]. The extent of how this applies practically to anaesthesia needs to be further defined.
**Conclusion(s):** Documentation of consent did not meet the proposed standard. Reasons are unclear but practice must improve to meet new recommendations; this will be reviewed in light of the awaited AAGBI guidelines.
We have adopted a multi-strand improvement approach. We are surveying the anaesthetists to ascertain whether consent is discussed but not documented. Patients are being asked to rate their satisfaction with the anaesthesia process and risk information provided. We plan a subsequent pilot of a paper consent form specifically for anaesthesia, to be delivered at preassessment, to allow a targeted and informed discussion on the day of surgery.
**References:**
1. New rules of consent - update on the UK law, 25th March 2015. www.rcoa.co.uk
2. Consent: patients and doctors making decisions together, General Medical Council June 2008
3. Consent for Anaesthesia, AAGBI, Revised edition January 2006

## 14AP03-7

### Codonics XL Printer - A single centre experience

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**Background and Goal of Study:** Patient safety has been the epitome of what we do as anaesthetists. Drug errors due to wrong labelling is 20%[1]. The Codonics drug label printer machine (CM) is a possible solution as opposed to preprinted labels (PL). Being the first hospital in Singapore to employ this system solely, we wanted to find out if the end user believes that this system improves work flow and contribute to patient safety.
**Materials and methods:** We sent out an electronic survey of 20 questions with a before/after format focusing on both the usability of the CM as well as drug delivery and patient safety using the Survey Monkeys™ for data collection/analysis after a period of training and usage.
**Results:** Response rate to the survey was 67%. Nearly half of the respondents (46.7%) are junior staff members who are major users of this system.
When queried on the adherence to Joint Commission International standards (JCIS) with PL, most respondents will write the drug concentration, be able to find appropriate labels and read the handwriting often. However, with respects to the date/time/preparer's name, most admit they rarely do so. In comparison to the CM, respondents feel that label creation is at least somewhat easier with respects to customization or creation of specialized labels. Most take a slightly longer time to create the labels.
With respect to safety, majority utilize the read-back function on the CM as well as double checking the vial contents and syringe contents before administration most of the time.
Overall, the respondents feel that patient safety has improved (53%), are generally satisfied with the CM (54%) and would choose the CM over PL (63%).
**Discussion:** The good response rate accurately reflects sentiment. Potential reasons for deviation from JCIS include clinical autonomy and lack of guidelines[2]. We feel CM eliminates this inertia and increases compliance.
IV drug administration has inherent risks. It is heartening to know that safety features of CM is widely employed and do not require incentive to improve results[3]. Read-back may potentially reduce delivery of expired drugs and infection as well as administration errors.
Further studies are needed to assess error reduction with introduction of CM.
**Conclusion(s):** CM has generally been well received by staff and feel that workflow and patient safety has improved with its introduction.
**References:**
1. Abeysekera A Anaes 2005
2. Webster CS Anae IC 2015
3. Jelacic S Anes Analg 2015

## 14AP03-8

### Declaration of Helsinki Implementation boosted by a SENSAR simulation and debriefing course

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**Background and Goal of Study:** Clinicians don't usually have specific training on team working and patient safety. The 2010 Declaration of Helsinki (DoH) of Patient Safety (PS) in Anesthesiology states accordingly, " Education have a key role to play in improving patient safety, and we fully support the development, dissemination and delivery of patient safety training".
Learning not technical skills in our classic learning system is difficult. According to international literature clinical simulation is called to be a very efficient method in adult learning specially useful in multidisciplinary high efficiency team training. Crisis Resource Management (CRM) method is a 15 key principles methodology developed for an effective teamwork in a crisis situation.
SENSAR is a non-profit Pacient Safety Organization founded by anaesthesiologists in 2009, including 86 different hospitals by now. It uses an incident reporting system and provides training for best practices in safety. After 5.000 critical incidents analized, SENSAR settled focus in human factor (individual or collective) and priorized team education as an aim, according to Helsinki Declaration.
**Materials and methods:** Supported by SENSAR, we developed a mixed online / on-site "Declaration of Helsinki - Crisis Resource Management course". E-learning program is followed by a one-day simulation and debriefing workshop dealing specifically with Declaration of Helsinki scenaries and CRM concepts.
A total of 30 students participated in 3 different editions. We surveyed them about satisfaction concerning the learning method in Patient Safety training.
**Results and discussion:** 100% students in three different groups answered our satisfaction survey.
The principal questions were about global calification, practical application, e-learning course and course organization.
The average for these items were:
- E-learning: 8.80
- Practical application: 9.14
- Global calification: 9.04

**Conclusion(s):** SENSAR has been stablished as an organisation boosting PS and DoH implementation. Learning programs in PS like ours should be developed.
Clinical simulation including debriefing is called to be an efficient tool to improve adult learning.SENSAR "DoH and CRM" course are suitable for changing PS strategies in hospitals.We would like to improve and spread the course to every single hospital in SENSAR and many other european Hospitals offering it to ESA.

## 14AP03-9

### National cross-sectional survey of the availability of essential anaesthetic drugs in Madagascar

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**Background and Aim of Study:** Availability of anesthesia drugs is essential for safe surgery. Recent years have seen repeated calls for tighter regulation of ketamine and worldwide shortages of drugs such as suxamethonium. Ensuring reliable drug availability is key to reducing the ‚third delay' as outlined by the Lancet Commission on Global Surgery[1]. The international charity Mercy Ships is working in Madagascar with the Ministry of Health on several quality improvement initiatives, including quantifying cost and availability of anesthesia drugs.
**Materials and methods:** Between September and December 2015, we conducted a survey of availability of essential anaesthetic drugs[2] and cost of a ‚caesarian anesthesia kit' patients need to purchase prior to surgery. Data was collected by face to face interview with anesthesia and pharmacy staff. We report interim findings from 14 out of 20 regional reference hospitals (RRH).

| *Medication* | Availability: Always | Availability:Sometimes | Availability: Never |
|---|---|---|---|
| Ketamine | 14/14 (100%) | 0% | 0% |
| Thiopentone | 12/14 (85.7%) | 2/14 (14.3%) | 0% |
| Propofol | 8/14 (57%) | 0% | 6/14 (43%) |
| Pancuronium | 7/14 (50%) | 2/14 (14.3%) | 5/14 (35.7%) |
| Morphine/pethidine | 4/14 (28.6%) | 4 /14 (28.6%) | 6/14 (42.8%) |
| Phenylephrine/ Ephedrine | 9/14 (64.3%) | 2/14 (14.3%) | 3/14 (21.4%) |
| Atropine | 11/14 (78.6%) | 2/14 (14.3%) | 1/14 (7.1%) |
| Diazepam | 11/14 (78.6%) | 3/14 (21.4%) | 0% |
| Halothane | 8/14 (57.1%) | 2/14 (14.3%) | 4/14 (28.6%) |

*[Availability of medications across 14 sites]*

**Results and discussion:** Suxamethonium and hydralazine are not available. Ketamine is universally available but halothane is available in less than 60% of RRHs. Pancuronium is the only muscle relaxant available but supply is unreliable. No hospital had access to all essential anaesthetic drugs on a standard list.
A ‘caesarian anesthesia' kit costs $87-100 USD compared to $0.5 USD for 1 kilo of rice, $0.8 USD for 1 litre of fuel and $1.8 USD for a bar of soap. The complete lack of suxamethonium and hence the use of pancuronium for all cases requiring rapid sequence induction is alarming. No amount of training or equipment donation can remedy drug supply problems.
**Conclusion:** Greater advocacy on behalf of low income countries is required to make essential anesthesia medication affordable and accessible.
**References:**
1. Meara JG, Leather AJ, Hagander L et al. Lancet. 2015 Aug 8;386(9993):569-624
2. Merry AF, Cooper JB, Soyannwo O et al. J Can Anesth (2010) 57:1027-1034
**Acknowledgements:** National Institute of Academic Anaesthesia UK, Education grant for L Baxter

## 14AP03-10

### Unmatched syringe pumps and syringes lead to significant pump flow error

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**Background and Goal of Study:** Target concentration infusion (TCI) is a computerized infusion system which set target site propofol concentration at demanded time point. Unmatched syringe brands and syringe mode could lead to significant drug dosage error. We want to verify the importance of mode selection and calibration for TCI use.
**Materials and methods:** Two different 50ml syringes were tested for Fresnius orchestra base workstation and orchestra model. We used a fixed-volume mode, and a fixed-duration mode to verify the error for fluid delivery. Average measurement errors in percentage and in total volume were recorded.
**Results and discussion:** Unmatched syringe modes could lead to systemic error from 5% to 18% in both syringes. In 2 hours infusion, the infusion volume could vary from 6ml to 17ml.
**Conclusion:** Self-correction to identify the compatibility of the syringe and infusion pump before use should be incorporated into standard practice. Unmatched syringe and syringe mode could be an error for drug delivery.

## 14AP03-11

### Quantifying anesthesia equipment needs in Madagascar as part of a national surgical plan

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**Background and aims:** The Lancet Commission on Global Surgery aims to help provide safe affordable and accessible surgery by assisting governments develop a National Surgical Plan[1]. Anesthesia services form an integral part of this plan, and accordingly need proper quantification.
The charity Mercy Ships is working with the Malagasy Ministry of Health to implement the WHO Surgical Safety Checklist (SSC) and donate Lifebox pulse oximeters to all Regional Reference Hospitals (RRH). Additionally, we aim to quantify anesthesia services so as to help develop a national surgical plan.
**Materials and methods:** Between September and December 2015, we taught the SSC, provided Lifeboxes and quantified the anesthesia equipment in 14 of 20 RRHs. Need was quantified using an ‚international standards' questionnaire, face to face interview and direct observation. Questionnaire answers for availability were scored using a 3 point Likert Scale. Here we present interim data from 14/20 regional sites.
**Results and discussion:** 14 of 20 RRHs were surveyed, serving a population of 7,212,537. Capnography was not available at any site and ECG monitoring was rarely used. Reliable oxygen supply and suction were available at 36% of sites; 50% of sites had a vaporiser. Universal lack of capnography and ECG monitoring indicates none of the 14 RRHs reliably achieved WHO standards. More than 50% of sites have adult airway equipment; however, few had pediatric supplies, a critical shortage as 85% of children in low income countries require surgery by the age of 15[2].

| *Equipment* | *Proportion of sites where equipment always available* | |
|---|---|---|
| Pulseoximeter | 8/14 (57%) | |
| Blood pressure monitoring | 11/14 (79%) | |
| Ventilator | 4/14 (29%) | |
| | ***Adult*** | ***Paediatric*** |
| Pulseoximetry probes | 8/14 (57%) | 0/14 (0%) |
| Self inflating bag | 11/14 (79%) | 6/14 (43%) |
| Oropharyngeal airway | 11/14 (79%) | 3/14 (21%) |
| Endotracheal tubes | 13/14 (93%) | 5/14 (36%) |
| Laryngoscopes | 8/14 (57%) | 5/14 (36%) |

*[Equipment availability at 14 referral hospital]*

**Conclusion:** All 14 hospitals could be easily and inexpensively equipped with donated or purchased pediatric and adult airway equipment as part of the national surgical plan.
**Acknowledgements:** Travel and Education grant for L. Baxter received from National Institute of Academic Anesthesia
**References:**
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2. Bickler SW, Telfer ML, Sanno-Duanda B. Trop Doct 2003;33: 91-4

## 14AP03-12

### Re-audit of accessibility of current guidelines for the anaesthetic machine check and management of anaesthetic emergencies

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**Background and Goal of Study:** Patients undergoing procedures under anaesthesia or sedation in theatre and non-theatre areas are at risk of anaesthesia-related incidents, cardiac arrest and peri-arrest problems. RCoA and AAGBI recommend access to guidelines for management of such problems in all areas where anaesthesia is provided.
However ongoing audit in Good Hope Hospital showed that access to hard copies of guidelines is sub-optimal. Audit in 2015 showed compliance to be abysmal at 34%. This was highlighted to theatre management and corrective measures implemented. Re-audit took place in December 2015 to evaluate success of this intervention.
**Materials and methods:** Ten theatres were examined for the presence of seven guidelines each. The remaining four high risk areas (two recovery areas, emergency and radiology departments) were examined for three 2015 Resuscitation Council algorithms. Data was analysed using simple statistical methods.
**Results and discussion:** Theatres were 100% compliant, having a full sets of guidelines. The four remaining high risk areas did not contain any guidelines. The overall compliance thus improved to 85%. This is an important patient safety issue as guidelines are essential to negate the effect of human factors in high pressure situations.
**Conclusion:** Whilst there is significant improvement in many areas, some sectors have been neglected. Ownership of the project by enthusiastic individuals led to remarkable change in theatres, but non-theatre areas need further input. Discussion with the relevant departments, education and incorporating a daily ‚guideline check' is the next step in ensuring compliance. Regular re-audit is essential to avoid complacency.
**References:**
1. Guidance on the Provision of Anaesthesia Services.London:Royal College of Anaesthetists,2015
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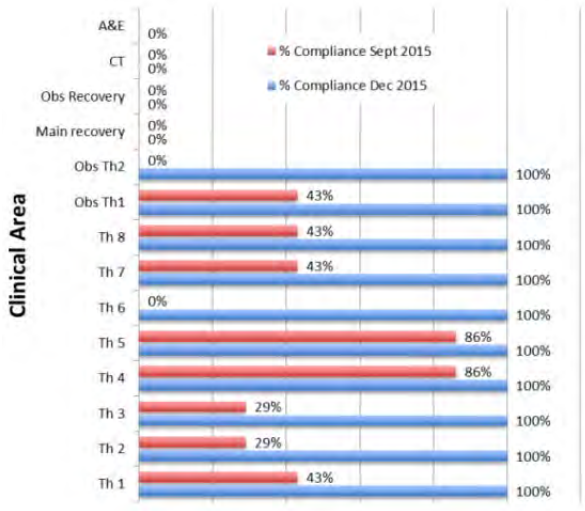
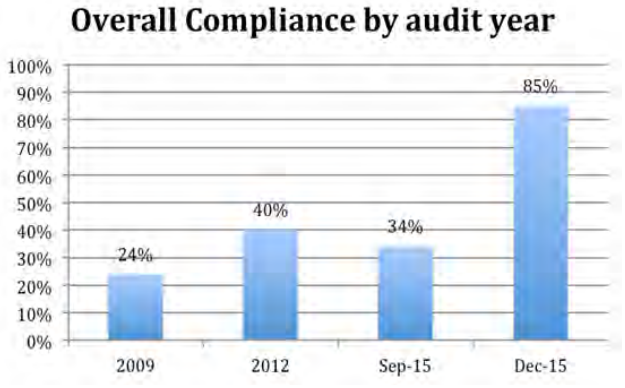



*[Comparison of Percentage Compliance by Area between audit and re-audit]*




*[Trend in guideline availability by audit year]*

## 14AP04-1

### What if we don't inflate the cuff of laryngeal mask airway (LMA) during spontaneous ventilation?

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**Background and Goal of Study:** Hyperinflation of the LMA cuff is considered a risk factor for airway morbidity and air leakage increases around the LMA.[1] Hypoinflation is related to air leakage. Manufacturers recommend inflating the cuff up to the maximum volumes recommended and/or adjusting cuff pressure (CP) <60cmH2O.[2,3]
Our aim was to measure CP and effective airway sealing when an LMA is inserted without any additional increase in cuff volume (CV), for endobronquial ultrasound (EBUS) procedures.
**Materials and methods:** After local Ethics Committee approval, we performed a prospective observational study. Patients classified as ASA I-III, aged >18 years old, scheduled for EBUS procedures under elective general anaesthesia, breathing spontaneously, were included.
LMA Ambu® Auraonce (size 3-5) was directly inserted from the sterile package without any variation (regardless the manufactures recommendation in respect of the volume). The CP was measured using a calibrator cuff manometer. Also, 3 inspiratory and expiratory tidal volumes were recorded when a good capnometry curve was obtained. Differences that appeared were defined as: leak volume (LV) (we consider acceptable <30 ml).
Complications such as sore throat, dysphonia and dysphagia were recorded in the first post-operative period.
**Results and discussion:** 69 patients were included in this study. 30,4%(n=21) inserted LMA had a CP>60cmH20. CP were significantly higher in size 4/5 LMA [32, 7% (n=18) -100% (n=3)] compared to size 3 (0%) (p=0,028).
Incidences in complications (all of them related to sore throat) were significantly higher when the CP>60cmH2O vs. those with <60cmH2O [38, 1 %( n=8) vs. 6, 3% (n=3), OR =9, 2 (95%CI 2,13-39; p=0,002)].
There was no correlation between CP and LV [75, 4% (n=52) LV <30ml]. LV was 3 times higher in LMA 4/5 vs. LMA 3.
**Conclusion(s):** In non inflated LMA, a significant percentage of them have a greater intra-cuff pressure than those generally recommended (<60cmH2O), with the additional appearance of sore throat. 75,4% of LMA had a LV <30ml. The larger size of the LMA (4/5) has a significantly higher CP and more LV. Therefore, CP should be measured routinely using a manometer to minimize potential pressure-related airway complications.
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2. Hockings.L, et al.; Pediatric Anesthesia 2010; 20: 313-317
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## 14AP04-2

### Can we integrate videolaryngoscope airway management in ERAS guidelines?

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**Background:** Multidisciplinary anaesthetist perioperative approach has recently focused on Enhanced Recovery After Surgery (ERAS), with different strategies to decrease patients perioperative stress, reduce organ involvement produced by surgical trauma and hasten the patient's general recovery, in order to reduce post-operative complications, improvement patients' safety and a reduction in mortality[1]. Endotracheal intubation is the gold standard for airway management. Although most of the patients are successfully intubated without major problems, failure may result in hypoxia, hypecarbia, various dysrrhythmias, cardiac arrest, brain damage or even fatalities. But, even in cases where intubation is achieved, it can leads to undesirable hemodynamics alterations (HA) response by soft tissue damage and marked sympatho-adrenal response due to stimulation of supraglottic tissues[2]. Videolaryngoscopes (VL) facilitates intubation without moving the patient's head and neck, producing less HA than the Macintosh Laryngoscope (ML)[3].
**Materials and methods:** We performed a search of the current literature on the different HA caused by the use of VL against ML.
**Discussion:** The use of a conventional Macintosh blade can induce tachycardia, hypertension and increase of plasma catecholamine concentrations (2) by direct stimulation of proprioceptors at the base of the tongue, depending on magnitude and duration of airway manipulation and duration of apnea.
HA may alter the delicate balance between myocardial oxygen demand and supply and precipitate myocardial ischemia in patients with coronary artery disease, which supposes a risk to present postoperative complications and delay recovery.
**Conclusion(s):** VL blade's angulation exerts minimal or no pressure on the upper airway structures during videolaryngoscopy (3), with less pressure on the tongue compared to the ML blade.
So that we believe that the use of VL can become standard of care for securing the airway in ERAS patients, even with normal airway, since minimize hemodynamic response to tracheal intubation.
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## 14AP04-3

### Inadvertent ultrasound-guided insertion of a central venous catheter into a carotid artery: the value of pressure transduction and blood gas analysis as additional tests to check position

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**Background:** Serious complications can result from an inaccurate central line placement.
**Case report:** A 38-year old man suffered several generalised tonic-clonic seizures and was intubated, ventilated and taken to ICU.
A central venous catheter (CVC) was inserted by a senior anaesthetist under ultrasound guidance. A chest X-ray showed correct level of the tip and no pneumothorax. A pressure transducer was connected and the trace obtained was neither typical of a CVC pressure trace or an arterial trace. 20 mins later it was needed to start Nor-Adrenaline infusion. However, suspicions had been aroused that the line was incorrectly placed.
A blood gas was therefore taken from the line; which showed to be clearly arterial with a pO2 of 38.2 kPa.
**Discussion:** Inadvertent and unrecognised arterial cannulation is a serious and possibly fatal complication.[1] A commonly-used test for confirming that a central line is correctly placed has been chest X-ray. The current American Society of Anesthesiologists (ASA) guidelines for central venous access recommend a chest X-ray as a method to verify catheter tip placement.[2] . Although an ultrasound-guided[3] approach is the standard approach for central line placement and has reduced the risk of inadvertent arterial placement,[4] Ho et al's report[5] and our experience both demonstrate that ultrasound-guided insertion does not abolish this risk.
If the CVC pressure trace produces an untypical or ambiguous reading, a blood gas analysis should then be done to confirm whether the tip of the line is in a vein or an artery. While a chest X-ray is still required to ensure no pneumothorax and correct position and depth of insertion of the catheter.
**References:**
1. Maietta PM. Accidental carotid artery catheterisation during attempted central venous catheter placement. AANA J. 2012; 80(4):251-55
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**Learning points:** Transduction and blood gas analysis are vital to confirm Central Venous position.

## 14AP04-5

### Incidental finding of a foreign body during rigid laryngoscopy - a pitfall for the anaesthesiologist

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**Background:** The assessment of airway is mandatory for any surgical procedure performed under anesthesia. However, it can be difficult in children because of lack of collaboration and anatomical and physiological features. Foreign bodies (FBs) in the airway are frequently reported among children. These can remain unnoticed for a long time without mucosal damage or airway obstruction.[1] We report a case of an incidental finding of FB during rigid laryngoscopy.
**Case report:** A 3-year-old caucasian boy, 20 kg, ASA I, presented for adenotonsillectomy and myringotomy in elective context. No relevant facts were found on medical history or on the airway evaluation, despite the hypertrophied tonsils. Anaesthesia was induced with oxygen and sevoflurane. After 50 mcg fentanyl, he was intubed orally with a 5 mm ID RAE tube. There was no respiratory distress at any time and surgery was started. When placing the rigid laryngoscope, one buttont was surprisingly found, in the nasopharynks, with nearly 1 cm in diameter. It was carefully removed with tweezers, without complications. A nasofibroscopy was subsequently performed for exclusion of mucosal lesions or the presence of other objects. The surgery took place uneventful.
**Discussion:** FBs in airway are common occurrence in pediatric but most are not reported in medical journals. Most common FBs in children are coins, marbles, buttons and batteries and this can be suspected by history or clinical signs, or incidentally discovered.[2] Complications may arise due to the presence of FB or with the procedure, and include bleeding, airway obstruction, laryngeal edema, infection and pushing the FB into the subglottic space, esophagus, or trachea and this may become an emergency. To avoid these complications, it is important a careful assessment of airway and teamwork between the anesthesiologist and the surgeon.
**References:**
1. Mahfouz AK, Khan MS. *Incidental finding or foreign bodies during nasal intubation in a mentally challenged patient.* Middle East J Anaesthesiol. 2013 jun; 22(2):191-4. Journal 2009, 2:9148.
2. Yasny JS. N*asal foreign bodies in children: considerations for the anesthesiologist.* Paediatr Anaesth. 2011 Nov;21(11):1100-2.
**Learning points:** Securing an airway is a vital task for the anesthesiologist. Increasing an anesthesia care provider's awareness of the significant implications of FBs can optimize safe management of this condition.

## 14AP04-6

### Availability of head-mounted display for ultrasound guided central venous cannulation

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**Background and Goal of Study:** Recently several types of head-mounted displays are available to use in the medical situation. Head-mounted display can provide the visualized information without moving direction of eyesight. Near-Eye Display (NED; under development product, JVC Kenwood, Japan) was a newly developed head-mounted type wearable display which was lightweight, easy to fit and had high image quality. Because ultrasound guided central venous cannulation technique requires two separate visual information; operating field information (needle and syringe) and sonographic information. We hypothesized that NED might be a promising assist device for ultrasound guided central venous cannulation.
**Methods:** Experienced anaesthesiologists performed the ultrasound guided central venous cannulation on training simulator with conventional standard method (without NED) and with NED method. Ultrasound real time image and operating field were record by video camera. From recorded video image, duration time from ultrasound probe setting onto the skin surface to the initiation of needle insertion (T1), from needle insertion to needle accessing the venous (T2), from needle accessing the venous to confirmation of guidewire by ultrasound image (T3) were identified and compared between two methods. Examinees intended to perform central venous cannulation with non-penetration manner, and the incidence of unintentional posterior venous wall penetration was also identified.
**Results and discussions:** Eleven anaesthesiologists performed central venous cannulation three times both with standard and NED method, therefore total of 66 procedures were completed. Duration time of standard and NED method were T1; 5.5±2.0 sec and 6.4±2.9 sec (p=0.13), T2; 7.2±3.9 sec and 6.7±3.8 sec (p=0.59), T3; 18.5±6.3 sec and 17.3±4.8 sec (p=0.38) and total time; 31.3±8.7 sec and 30.2±7.9 (p=0.61). Unintentional posterior wall penetration happened 7 times (21%) with standard method and 3 times (9%) with NED (p=0.17). With NED, cannulation time was similar to standard method and posterior wall penetration tended to happen less frequently.
**Conclusion:** Considering all examinees had never trained NED method before this study, and had been fully experienced central venous cannulation with standard method, NED seems to be a promising assist device for ultrasound guided central venous cannulation.

## 14AP04-7

### Forced air warming device failure resulting in smoke and soot on a surgical patient

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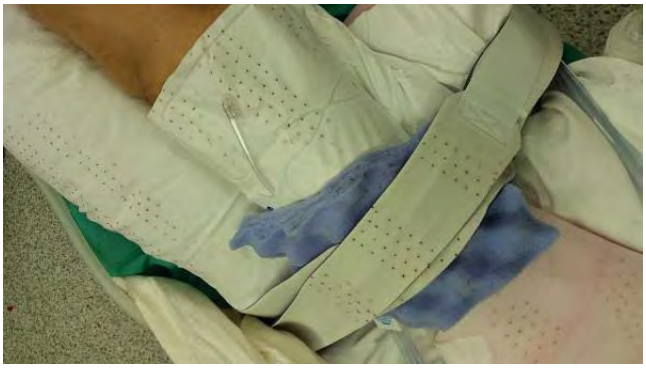
**Background:** Forced air warming (FAW) devices are used in the operating room to maintain normothermia. Proper use involves connecting the hose of the warming unit to a disposable blanket with a perforation pattern that evenly distributes heat (1,2).
**Case report:** A 67 year old patient with lung cancer presented for robotic-assisted left upper lobectomy. The patient was taken to the operating room, ASA monitors were applied, general anesthesia was induced, and the airway was secured. After positioning, a FAW blanket was applied, and the heating device was set to 43°C. Foley temperature was 35.7°C, decreased to 35.0°C, and increased to 35.8°C by the end of the case. At the end of surgery, the line isolation monitor alarmed and was investigated. A few minutes later smoke was noticed in the field, and the drapes were removed to identify the source. No flames were seen, and no obvious source of smoke was identified. Black punctate spots were noted on the sheets and the patient's legs (Fig 1) in the pattern of the FAW blanket holes. The soot was wiped off the patient, and no injury was seen. The blanket was dry, but the warming unit sat in spilled irrigation.



*[Fig 1, soot deposits]*

**Discussion:** Our institutional biomedical service evaluated this incident and device and concluded that the air-intake on the bottom of the unit entrained irrigation into the device, causing a short circuit within the unit. This electrical short created smoke inside the device, which was then blown out through the hose and deposited as soot through the perforation holes in the inflatable blanket. The unit was removed from service and returned to the manufacturer. This is a case of a near-miss that could easily have resulted in an OR fire.
**References:**
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2. http://www.apsf.org/newsletters/html/2002/spring/13warmingdevices.htm
**Learning points:** Attention to fluids around electrical devices can minimize intraoperative fire risk.

## 14AP04-8

### Preventing central venous catheter guidewire retention using a novel safety procedural pack: a pilot clinical simulation randomised controlled trial

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**Background and Goal of Study:** Central Venous Catheter (CVC) guidewire retention is a frequent ‚never event'. An engineered solution, the safety procedure pack (SPP), ensures the procedure is impossible to complete without removing the guidewire. For prevention of serious but rare events, interventions must not impact adversely on the normal procedure and should be easy to train staff and implement widely. This study tests the hypothesis that doctors in a high risk scenario, with no training or familiarity with the SPP, will avoid the error of guidewire retention through its use.
**Materials and methods:** The SPP is a box containing a suture, suture holder and antimicrobial dressing. The SPP has a simple key system opened by inserting a guidewire into a labelled hole. With IRB approval and written consent, doctors experienced in CVC placement were randomised to simulation of routine practice (RP) or SPP and presented with a scenario whereby a colleague had been urgently called away mid-CVC insertion. Participants were asked to safely complete the procedure as per their normal practice. The manikin model had the CVC inserted with the guide wire left in the distal lumen, visible through the transparent tubing to the hub and retrievable with forceps from the hub. No guidewire was present on the trolley or in the empty sharps bin. A monitor showed ectopic beats. If specifically asked, the junior assistant stated only that the SPP was a new safety procedure pack recently introduced into the hospital containing the sutures and dressings which could be used as a sharps repository after placement.
**Results and discussion:** The SPP prevented guidewire retention before returning the patient to the ward (80% RP v 0% SPP retention, n=20, p<0.001, Fisher's Exact test). In the SPP group, participants undertook searches of trolley, floor and/or sharps bin before the realisation of the intra-luminal location of the wire and all (10/10) were removed without complications. A structured participant questionnaire showed the SPP improved guidewire safety, convenience and sharps/wire disposal safety (10/10).
**Conclusions:** Using the SPP proved significant success in preventing the never event of CVC guidewire retention, alongside facilitating normal catheter placement.

## 14AP04-9

### Sight related complaints after prolonged laparoscopic oncogynecologic surgery

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**Background and Goal of Study:** Minimally invasive surgery is used in order to reduce surgical aggression and to minimize morbidity. Recently the safety of prolonged laparoscopic surgery has been called into question due to the possibility of increase in intracranial pressure caused by pneumoperitoneum and Trendelenburg position. One of the complications is thought to be related to sight. The goal of the study was to evaluate the rate of sight related complaints among women who underwent prolonged laparoscopic oncogynecologic surgery and to assess the impact of surgery duration on the rate of complaints.
**Materials and methods:** A retrospective cohort study was carried out in a teaching hospital. Medical records were analyzed of women who underwent laparoscopic oncogynecologic surgery lasting three hours or longer in the Trendelenburg position in 2013-2014. Subsequently all these women were contacted by phone in order to obtain the information regarding their sight following the surgery.
**Results and discussion:** Of 82 patients who fit the inclusion criteria, 57 (69,5 %) were successfully contacted and included in the study. The average age of patients was 61,1 (±8,6) years. The average duration of surgery reached 217,8 (± 58,2) minutes, ranging from 3 to 8 hours. During the interviews via phone 40,4% (n= 23) of patients expressed complaints related to sight following the surgery. The rate of those complaints statistically significantly depended on the duration of surgery (p=0,011).
Overall 29,7% (n=17) of patients complained of decreased eyesight making up 73,9% of all cases of visual disturbances. Seven (12,3%) patients reported shimmering or black dots in the field of vision (30,4% of all complaints). Feeling of pain or tension in the eyes was the main complaint in four (7,0%) cases. In 30,4% (n=7) of cases related to sight complaints the visual disturbances occurred immediately after the surgery, the remaining cases manifested a few weeks or months later. In 20 cases (35,1% of all study patients) the sight problems are present to this day.
**Conclusions:** The rate of sight related complaints among patients following prolonged laparoscopic surgery is prominent and correlates to the duration of surgery. It shows that patient-safety oriented guidelines for prolonged laparoscopic surgery need to be created, proving the necessity of future research aimed at evaluating the direct link between changes in intracranial pressure and prolonged laparoscopic surgeries.

## 14AP04-10

### Ribs *à la carte*

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**Background:** Thoracic outlet syndrome refers to a constellation of signs and symptoms as consequece of compression of brachial plexus and subclavian vases in their path through scalene triangle. One of the commonest variations is the existence of cervical ribs, which are found in 1% of the population. The existence of this variation predisposes to structures injury specially when associated with hyperextension or hyperabduction of upper limbs. Although the clinic signs have an insidious onset it could appear anew symptoms after long positioning during surgery (1-2).
**Case report:** To illustrate this situation we present a case report of 66 years old woman, ASA II, victim from a fall from height with consequent fracture of D11 and proposal for percutaneous fixation of D10-D12. The patient, with corporal mass index 20, was asymptomatic at the time of surgery without any associated neurological deficit. For surgical procedure, the patient was placed in the prone position with hyperextension and hyperabduction of the upper limbs; special care has been taken to protect pressure areas. The surgery took about four hours with no significant blood loss or persistent hypotension. After anesthetic recovery was noticed that the patient had a left upper limb plegia associated with hypoesthesia of the same side. From the clinical research it was identified two cervical ribs in the pre-anesthetic chest x-ray and a diagnosis of thoracic outlet syndrome was made. Following surgery the patient initiated therapy with corticosteroids and physiotherapy (3). Three months later, there was complete recovery of strength and sensibilty in the affected limb, but the patient still had some degree of neuropathic pain.
**Discussion:** About this clinical case we present this paper to make aware of the importance of pre-anesthetic evaluation because of the possibilty, sometimes very common, of anatomical variations that could lead to injuries resulting from extreme positioning during surgery that may go unnoticed in that first evaluation.
**References:**
1. Sanders RJ, Hammond SL, Rao NM. Diagnosis of thoracic outlet syndrome. J Vasc Surg 2007;
2. Sanders RJ, Hammond SL. Management of cervical ribs and anomalous first ribs causing neurogenic thoracic outlet syndrome. J Vasc Surg 2002;
3. Cuetter AC, Bartoszek DM. The thoracic outlet syndrome: controversies, overdiagnosis, overtreatment, and recommendations for management. Muscle Nerve 1989;
**Learning points:** Cervical ribs, patient positioning

## 14AP04-11

### Effects of compression stocking on cerebral oxygen saturation in patients undergoing surgery in beach-chair position

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**Background and Goal of Study:** Catastrophic neurologic complications related with shoulder surgery in the beach chair position have been reported. We aimed to investigate the effects of applying compression stocking on cerebral oxygen saturation trying to reduce cerebral desaturation events.
**Materials and methods:** Patients were assigned randomly to either the control group or thigh-high compression stocking (CS) group according to randomization. All patients were placed in the supine position and sensors for Near-infrared spectroscopy (NIRS) and BIS were placed. After the induction of general anesthesia, patients were changed to place in the beach-chair position tilting up to 40. Mean non-invasive blood pressure, invasive arterial blood pressure and regional cerebral tissue oxygen saturation ($rSO_2$) were recorded at the following times: before the induction of anesthesia,
5 minutes after the induction of anesthesia, 3 minutes and 5 minutes after the beach-chair position,
1 hour after the beach-chair position, and 5 minutes after the supine position at the end of surgery.
A decrease in the $rSO_2$ of 20% or greater from the preoperative baseline was defined as a cerebral desaturation events (CDE). When cerebral desaturation occurred, we checked blood pressure, depth of anesthesia, end-tidal carbon dioxide tension, and hemoglobin. If it persisted, intravascular fluid or ephedrine 5 mg was administered.
**Results and discussion:** The overall repeated-measures ANOVA revealed that $rSO_2$ decreased significantly from 3 minutes after placing patients in the beach chair position and restored after repositioning to the supine position. Noninvasive arterial pressure and invasive arterial pressure at the level of middle ear also showed similar results. There was no interaction effect and statistically significant difference in cerebral $rSO_2$ value between groups. The incidence of hypotension was
72.7 % in the control group and 27.3 % in the CS group. The incidence of CDE was 47.1% in the control group and 52.9% in the CS group.
**Conclusions:** This study showed that overall patients showed a decrease of the value of blood pressure and $rSO_2$ after the beach chair position. The patients wearing thigh-high compression stocking tended to have lower incidence of hypotension but it could not contribute to prevent CDE.

## 14AP05-1

### Variability due to hospital on mortality in oncological gastric surgery in Spain

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**Background and Goal of Study:** High attributable variability to hospital on outcomes, if present, may indicate a substantial room of improvement in health care delivery. This study aims to quantify the variation in risk adjusted mortality in oncological gastric surgery between hospitals.
**Materials and methods:** A retrospective national population based study using data from "Conjunto Mínimo de Datos al Alta Hospitalaria" (CMBD) of the "Sistema Nacional de Salud" (SNS) in Spain was performed. All SNS patients discharged with diagnosis of gastric cancer (ICD-9 codes 151.XX and 230.2) that underwent total or partial gastrectomy (ICD codes 43.XX) between 1 January 2006 and 31 December 2009 were identified, and a random intercept logistic regression model for hospital cluster was fitted, achieving risk adjustment through variable model selection using two standard criteria, namely the loglikelihood and discrimination of the model using the area under the receiver operating characteristics (AUROC) curves. Once the final model being fitted, to assess the amount of variation between hospitals, the random effects variance was calculated, and the intraclass correlation coefficient (ICC) roughly interpreted as the proportion of total variation explained by clustering, was also determined.
**Results and discussion:** We identified 7547 patients who had oncological gastric surgery in one of 248 hospitals, with a raw mortality rate of 8.77%. The risk adjustment model included age (odds ratio [OR] 1.07, 95% confidence interval [CI] = 1.06 to 1.08, p <0.001), low mortality ICD-9 diagnosis -(diagnosis codes were amalgamated in low and high mortality due to the great number of codes to account for)-,(OR 0.59, 95% CI = 0.49 to 0.71, p <0.001), charlson score greater than zero (OR 1.43, 95% CI = 1.20 to 1.71, p <0.001), female sex (OR 0.76, 95% CI = 0.64 to 0.91, p = 0.003), and elective surgery (OR 0.46, 95% CI = 0.39 to 0.56).
The model had an AUROC curve of 0.76 (95% CI =0.73 to 0.77) indicating good discrimination ability. Patient related factors accounted for 91.8% of the outcome variation, with a considerable impact of hospital on outcome (ICC of 8.2%).
**Conclusion(s):** Most of the outcome variability in oncological gastric surgery is related to patient factors, however, a considerable amount is related to hospital factors indicating a room for improvement to reduce such variability.
**Reference:**
Pinheiro, J. and Bates, D. (2000). Mixed-Effects Models in S, Springer New York.

## 14AP05-2

### Prolonged hospitalization predictors in radical prostatectomies

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**Background and Goal of Study:** Radical prostatectomy (RP) remains one of the primary management options for localized prostate cancer. Efforts to improve quality and efficiency of care may have a large impact.1
The aim of this study is to analyze the predictors of prolonged hospitalization in RP.
**Materials and methods:** Retrospective analysis of patients undergoing RP in a central hospital during 2014. The variables analyzed were: age, the ASA (American Society of Anesthesiology) classification, intraoperative blood loss, the surgical time, fluid and blood therapy, analgesia, postoperative pain and hospital stay. Statistical analysis are performed using SPSS Statistics® 23, percentages were used for categorical variables; average with standard deviation (SD) or median with quartiles for nominal variables, depending on normality. The Kruskal-Wallis, Mann-Whitney U tests and Spearman's correlation were performed according to the characteristics of the variable and considered statistically significant a p-value <0.05.
**Results and discussion:** In total 114 RP were performed. Patients had a mean age of 64.7 years (SD 6.7).
The age (p=0.717) and ASA classification (p=0.999) did not influence significantly the days of hospitalization. There were no statistically significant differences between the days of hospitalization, the postoperative analgesia (p=0.638) and postoperative pain (entry at recovery room p=0.850; exit from recovery room p=0.298; at 24 hours post-operative p=0.952; at 48 hours post-operative p=0.109 and at discharge p=0.190). The intraoperative blood loss (p=0.052) and surgical time (p=0.538) did not vary significantly with days of hospitalization. The type of fluids administered intra-operatively (p=0.804) and the amount of crystalloid (p=0.143) and colloids (p=0.054) did not affect the hospitalization days. The administration of blood components in the immediate perioperative period (p=0.015) and in the ward (p<0.001) conditioned significantly the days of hospitalization after RP.
With implementation of an enhanced recovery after surgery pathway, the median length of hospital stay is significantly reduced for patients undergoing RP.1
**Conclusion(s):** Restrictive transfusion criteria has been shown to improve outcomes, should be used whenever possible to maximize benefit and ameliorate possible risks.2
**References:**
1. Can Urol Assoc J. 2014;8:418-23
2. Clin Genitourin Cancer 2015;13:e173-81

## 14AP05-3

### Application of a strict post-cardiac arrest management protocol results in similar outcome results for patients admitted during or out office hours

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**Background and Goal of Study:** In out-of-hospital cardiac arrest (OHCA), neurological outcome is determined by the severity of neurological injury, early percutaneous coronary intervention and application of neuroprotective targeted temperature management (TTM). As this management requires a very time- and manpower intensive protocol, we hypothesized that there could be a difference in outcome between OHCA patients admitted during compared to out of office hours.
**Materials and methods:** We prospectively collected demographic data of OHCA patients -of presumed cardiac cause- in two hospitals. Both institutions use a detailed postCA protocol with strict management guidelines (1). These include -for all post-CA comatose patients- application of TTM (33°C for 24 hours) and strict instructions for general ICU management. Out of office hours was defined as arriving between 5PM and 8AM and during the weekend or on official holidays. Neurological outcome at 180 days was assessed following the Cerebral Performance Category (CPC) scale.
**Results and discussion:** A total of 152 OHCA patients were included. Forty-seven (31%) patients were admitted during office hours and 105 (69%) out of office hours (p=0.199). Patients admitted during office hours were significantly older, respectively 66±14 and 59±15 years (p=0.014). There was no significant difference between both groups in number of patients who underwent coronary angiography nor in door to angiography time. All patients received TTM, without any difference between both groups in time to target temperature 33°. Median time spent in target range, referring to postCA protocol, of PaO2, PaCO2 and lactate -during first 24h postCA- was also not significantly different. Finally, we found no significant difference in survival until 180 days between both groups (47% during vs 51% for out office hours; p=0.599), even after adjustment for age (95% confidence interval, 0.44-1.90, hazard ratio 0.912).
**Conclusion(s):** Survival until 180 days between OHCA patients admitted during office hours or out-of office hours was not significantly different in two hospitals utilizing a fixed protocol for postCA management and a 24/7 streamlined access to coronary angiography.
**Reference:**
1. Ameloot K et al, (2015) Resuscitation;91:56-62

## 14AP05-4

### Effect of advanced age on morbidity during endoscopic sedation

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**Background and Goal of Study:** We aimed to evaluate retrospectively morbidity in elderly patients during endoscopic procedures (gastroscopy, colonoscopy).
**Materials and methods:** After Faculty Ethics Committee approval, anaesthetic records of 521 patients who have undergone endoscopic procedures with sedation, between January 2015 and September 2015. Demograghic variables in subgroups of geriatric patients according to age (Group 1: 65-74 years; Group 2: 75-84 years, Group 3: 85 and over) were analyzed. Operational variables consisting of anaesthesia duration, total dose of anaesthetic drugs and morbidity (hypoventilaton, hypoxia, arrythmia, hypotension) were examined. Student's t-test and Mann-Whitney U test were used to compare the results and a level of $p<0.05$ was accepted as significant.
**Results and discussion:** Results of 85 patients were excluded from the study because of incomplete records. All patients were monitorized as defined in American Society of Anesthesiologists guidelines and standards. Mean age of patients was 53.9 years. Number of geriatric patients was 127 (29.6%). Mean age in Group 1 (46 %) 69.77 years, Group 2 (42 %) 78.55 years and in Group 3 (11.7) 88.73 years. Duration of anaesthesia was similar in all age groups.
Distribution of procedures according to age groups were as follows: Group 1: 16 (27%) gastroscopies ; 20 (33%) colonoscopies, 23 (38%) double procedures; Group 2: 18 (33%) endoscopies; 15 (27%) colonoscopies, 21 (38%) double procedures; Group 3: 3 (20%) endoscopies; 3 (20%) colonoscopies, 8 (53%) double procedures.
Propofol and midazolam doses were similar in all groups. Fentanyl dose was significantly higher in Group 3, and complication rates were significantly high also in Group 3 compared to Group 1 and 2 ($p<0.05$). Arrythmia was observed as 1.7 % in Group 1, 3.7 % in Group 2, and 6.6 % in Group 3($p<0.05$). Desaturation was observed only in Group 3 with a incidence of 6.6% ($p<0.05$).
**Conclusion(s):**
1. Anaesthesia forms can be filled more accurately.
2. Especially in patients over 85 years, for safe anaesthesia delivery, monitorization and careful titration of anaesthetic drugs are" essential.

## 14AP05-5

### Fequency and risk factors of physical restraints in a tertiary hospital ICU

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**Background and Goal of Study:** Restraints are widely used in ICUs to preserve patient safety and maintain ongoing invasive therapies when patients are poorly cooperative. However they are frequently applied from utilitarian and intuitive perspective. We aimed to study the frequency and main determinants of physical restraints practice in a mixed 28 beds ICU of a tertiary hospital.
**Materials and methods:** In this prospective single-center descriptive study we evaluated 216 ICU patients from 10 July to 15 September 2015. Links between physical restraints and following parameters were traced: age, gender, nurse to patient ratio, night vs. daytime admissions, history of psychoactive medication, presence of respiratory support. Nurses were principal decision makers for restraints application. Statistical difference between groups was determined by chi-square test for independence using Pearson criteria. Analysis was performed on IBM SPSS Version 22
**Results and discussion:** Physical restraints were applied in 83 (38.4%) of patients. Risk of use significantly increased with age (56.6% for >60 y.o. vs 23.7% for <60 y.o.), male gender (46.2% vs 31.9% for females), respiratory support (68.2% vs 25.8%), elevated(>1:3) nurse to patient ratio (49.2% vs 29.6%) and night time admissions (98.2% vs 18.5% for day time) ($p<0.05$). Whereas positive history of psychoactive or sedative medications didn't influence the risk of physical restraints (60% vs 37.1%) ($p = 0.079$).
**Conclusion(s):** Our data showed high frequency of physical restraints in general ICU patients. While age and respiratory support are well-known risk factors, significant impact of elevated nurse/patient ratio seems to reflect shortage of manpower in a given ICU. Gender and night/daytime influence can be the result of heuristic approach. These results prompted us to review local guides and launch educational programme for ICU nurses. ICU staff should look for alternatives to restraints when possible with proper justification aside from personal intuition and heuristics.

## 14AP05-6

### Incidence of intraoperative awareness in non-critically ill patients receiving elective surgery

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**Background and Goal of Study:** Intraoperative accidental awareness (AA) during general anesthesia can be devastating to the patients by resulting in long term neuropsychiatric sequelae. The reported incidence of perioperative awareness ranged from 0.006% to 0.13%. Historically, the critically ill patients received major surgeries carried increased risks of developing AA, due to suboptimal levels of anesthesia. Since the incidence of AA in the non-critically ill patients has not been previously reported, this study analyzed the incidence and the associated risk factors for the occurrence of AA in patients with ASA class I-III during elective surgeries.
**Materials and methods:** We reviewed the postanesthesia visit record in our medical center from January 2009 to December 2013. Patients received regional anesthesia, day surgery, ASA class ≥IV, and admitted to intensive care units after surgery were excluded. Intraoperative AA was defined according to the Michigan awareness instrument and the NAP5 severity. Patients reported to have AA were interviewed by a nurse anesthetist and medical records were reviewed by four staff anesthesiologists. The Poisson regression model was used for simultaneous analysis of the association between incidence proportion of AA and the potential risk factors in patients at risk and patients with definite AA.
**Results and discussion:** A total of 58,181 inpatients (ASA ≤III) received general anesthesia over the past 5 years, and 16 patients were identified as definite AA (3 patients were excluded after committee review). Patients received endotracheal anesthesia carried significantly higher incidence of developing AA ($P= 0.015$), and female patients tended to increased risk for AA (62.5% vs 44.9%, $P= 0.209$). ASA class and genders were similar between patients with and without AA. Compared with the matched controls, longer surgical time and higher educational levels were associated with increased incidence of AA. Surprisingly, higher mortality rate was found in patients who developed AA (18.8% vs 8.4%, AA vs controls, $P= 0.129$).
**Conclusion(s):** The overall incidence proportion of AA was 0.0275% in the non-critically ill patients received elective surgeries during general anesthesia. Endotracheal anesthesia, prolonged operation time and higher education levels were associated with increased risks for development of AA. The relationship between AA and postoperative mortality requires further investigation.

## 14AP05-7

### Incidence and characteristic analysis of in-hospital falls after anaesthesia

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**Background and Goal of Study:** Postoperative falls is a relatively rare complication that could have been overlooked in clinical anaesthesia. In-hospital falls are particularly serious events resulting in bone fracture, traumatic head injury, visceral organ contusion, and skin abrasion. These in-hospital adverse events not only increase the length of hospital stay and cause extraneous medical expense, but may also engender unnecessary medical disputes. The incidence of postoperative falls may theoretically increase in patients receiving anaesthetic management due to the residual pharmacologic and neuromuscular blocking effects of anaesthetics. However, the anaesthetic effect on the postoperative falls is hard to identify from these previous studies and there is currently no study reported the incidence of post-anaesthesia falls.
**Materials and methods:** We reviewed the postanaesthesia visit of patients received anesthesia in the Hualien Buddhist Tzu Chi General Hospital, Taiwan (IRB approval number IRB103-14-B) from January 2009 to December 2013.

Falls happened within 24 hours after anesthesia were recorded. The Poisson regression model was used for simultaneous analysis of the association between incidence proportion of postanaesthesia falls and the potential risk factors.
**Results and discussion:** A total of 60,796 inpatients received anaesthesia management over the past 5 years and 10 patients fell within 24 hours after anaesthesia. All cases happened in the general wards. Falls occurred more often at the bedside, presence of caregivers and during the daytime. Patients underwent regional anaesthesia and old age significantly increased the risk of postanaesthesia falls, while differences in gender and ASA physical status did not affect the occurrence of postanaesthesia falls.
**Conclusion(s):** The overall incidence proportion of postanaesthesia falls is approximately 1.6 cases per 10,000 patients over a 24-hour observation period. Falls are more commonly happened during the less attentive periods after operation, and are increased in the elderly and patients received regional anaesthesia. This study highlights that most of the postanaesthesia falls are preventable, and more comprehensive clinical practice guidelines for postoperative care should be exercised to prevent the in-hospital falls.

## 14AP05-8

### The usefulness of OS-MRS in the prediction of hospital length of stay - a retrospective audit in a tertiary hospital

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**Background and Goal of Study:** Patient risk stratification plays a central role in the daily practice of anaesthesiologists. Obesity Surgery Mortality Risk Score (OS-MRS) was developed and validated to predict mortality at 90 days for patients submitted to bariatric surgery. The aim of our study was to evaluate if OS-MRS is a good score for prediction of hospital length of stay following bariatric surgery in a tertiary hospital.
**Materials and methods:** After approval by the institutional review board, clinical records of 393 patients submitted to gastric bypass surgery were audited between January 2010 and May 2015 in a Portuguese tertiary hospital. Clinical and demographic data, such as age, gender, American Society of Anaesthesiology (ASA) Physical Status Classification, Body Mass Index (BMI), OS-MRS score, duration of surgery and hospital length of stay were collected. Patients were divided into the three classes based on OS-MRS score according to the presence of five clinical characteristics (BMI>50, male sex, arterial hypertension, known risk factors for pulmonary embolism and age >45 years old). Class A - OS-MRS=0-1; Class B - OS-MRS=2-3; Class C - OS-MRS=4-5. The relationship between OS-MRS classes and the hospital length of stay was analysed. Statistical analysis was performed using SPSS® version 23 - Kruskal-Wallis with Dunn post hoc test. $p<0,05$ was considered statistically significant.
**Results and discussion:** A total of 393 (82,2% female) patients were included. Average age was 43,91 years old (±10,59). ASA 2 - 21,2%; ASA 3 - 78,4%. Average BMI was 44,20 Kg/m$^2$ (±6,36) and duration of surgery 132,52 minutes (±40,23).
A total of 168 patients were classified as OS-MRS Class A, 184 as class B and 41 as Class C, with average hospital length of stay, in days, of 3,2 (±1), 3,5 (±1,2) and 3,8 (±1,3), respectively. Comparing classes A and B and also classes B and C, there was no difference in the length of stay of these patients ($p=0,079$; $p=0,284$, respectively). A statistically significant difference was observed between classes A and C ($p=0,014$).
**Conclusion(s):** It seems to be a positive correlation between OS-MRS classification and hospital length of stay, with patients classified with higher classes spending more time in the hospital.Care of these patients should be improved to prevent complications and decrease number of days in the hospital.

## 14AP05-9

### A bifactorial postoperative cerebral ischemic stroke (PCIS)

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**Background:** PCIS is a serious postoperative complication with great impact on patient's morbidity and mortality. Surgery and anesthesia can increase the likelihood of PCIS. Other risk factors are coexisting cardiac and neurologic disease, intraoperative hypotension, dehydration, anticoagulant drugs interruption, exaggerated use of metoprolol, and cannabis sativa users.
**Case report:** This case report is focused on an unidentified marijuana abusing patient with previously unknown concomitant patent foramen ovale, undergoing general anesthesia for routine urologic surgery, who developed unexplained arterial and venous PCIS.
A 19 year old male, had Anderson-Hanes pyeloplasty. Medical history, physical examination, biochemistry and coagulation tests were normal. Premedication, intraoperative monitoring, anesthesia technique, and extubation and postoperative period were uneventful. The day after surgery, suddenly the patient's blood pressure and heart rate increased to 170/90 mmHg, and heart rate 110 bpm. There was no verified medical reason for the situation. He developed a "locked in syndrome" with no apparent neurological deficit. Lab examinations were normal. The patient was conscious but with right abnormal Babinski sign and non constant visual loss. MRI showed multiple acute ischemic zones, predominantly in left occipital lobe, venous thrombosis of transverse and left sigmoid sinuses. After postoperative detailed medical history, it was found that he was a regular marijuana user. Transthoracic echocardiography revealed atrial septum aneurysm and patent foramen ovale. After intense treatment the patient was discharged on 8-th postoperative day fully recovered.
**Discussion:** As a conclusion when a chronic cannabis user patient is scheduled for surgery, we strongly recommend taking patient's detailed medical history, strict physical examination for thrombotic phenomena or previous stroke, mild intraoperative hypertension, and perioperative anticoagulant drug use. When a patient has a congenital malformation we must be aware of a possible second congenital malformation especially a cardiac one.
**References:**
1. Predicting perioperative stroke. J Neurosurg Anesthesiol.1995
2. Risk of surgery and anesthesia for ischemic stroke.Anesthesiology 2000
3. Perioperative acute ischemic stroke in noncardiac and nonvascular surgery: Incidence, risk factors, and outcomes.Anesthesiology 2009
**Learning points:** Detailed medico-social history is crucial when preparing a patient for anesthesia.

## 14AP05-10

### Mendelson's syndrome, a challenge for anesthesiologist and intensivist

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**Background:** Aspiration pneumonia has been a very difficult challenge for both anesthesiologist and intensivist as long as it is a life threatening condition very difficult to manage and treat. It is a complication of anesthesia characterized by the inhalation of gastric content or foreign material into lungs. The aspiration of gastric content causes chemical pneumonia known as Mendelson's Syndrome.
**Case report:** We present a case of a 85 years old patient who presented with a mechanical bowel obstruction. He was hypertensive, diabetic and had an advanced stage of Parkinson's disease. He was urgently taken into the operating room after placing a nasogastric tube and having his stomach emptied. He was preoperatively evaluated as Mallampati 4 and bronchoscopy was taken into the operating room. Before induction he had vomiting attacks causing aspiration of gastric content. It caused severe hypoxemia and he was intubated immediately. After CPR the patient was stable and he was operated. After theoperation the patient was transferred to the ICU. In the operating room bronchoscopy was performed to remove the foreing material. The x-ray showed diffuse bilateral parenchymal infiltration. The patient was aspirated several times via bronchoscopy in intensive care. He was extubated on the third postoperative day and he was transferred to the ward after 5 days in a good condition.
**Discussion:** In ICU we saw that the benefits of bronchoscopy were crucial. The patient improval was fast despite his co-morbid conditions and he

managed to disconnect from the respiratory assistance quickly. He was discharged 2 weeks later in a good condition.

**References:**

1. Anesthetic management of patients with “a full stomach”. A critical review. Salem MR
2. Dines De, Baker WG, Scantland WA. Aspiration pneumonitis--Mendelson’s syndrome. JAMA. 1961 Apr 22;176:229-231
3. Clinical impact of early bronchoscopy in mechanically ventilated patients with aspiration pneumonia. Respirology. 2015 Oct;20(7):1115-22. doi: 10.1111/resp.12590. Epub 2015 Jul 6.

**Learning points:**

1. Bronchoscopy in operatory room is mandatory in patients with difficult airway and those with high risk of aspiration.
2. Avoid oversedating patients.
3. If bacterial aspiration pneumonia is not treated early, it can lead to development of complications, including lung abscess and bronchopleural fistula and eventually death.

## 14AP05-11

### Practical use of electronic early warning scores in a surgical ward: an observational study

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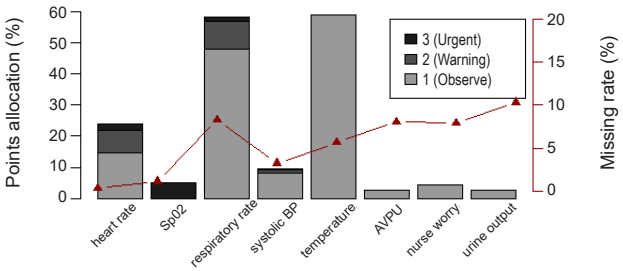
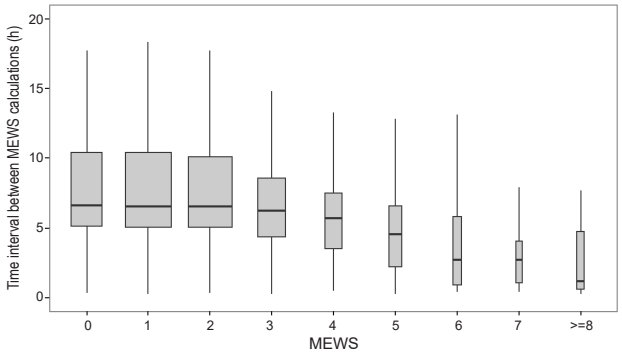
**Background and Goal of Study:** Early Warning Scores (EWS) have become a common tool to identify patients at risk of deterioration. The aim of this observational study was to gain insight into the day-to-day application of digital EWS registration in a surgical unit.

**Materials and methods:** This retrospective observational study included 384 patients admitted to the Step Forward Unit between 1 June 2013 and 31 August 2014. This unit was created as a general ward targeting patients who had undergone major surgery. The vital signs were collected using Philips’ IntelliVue Guardian Solution (Philips Medical Systems, Boeblingen, Germany), which also performed an automated calculation of the Modified Early Warning Score (MEWS) (locally adapted from Subbe *et al.*[1]).

**Results and discussion:** The dataset contained 4923 spot-check observations, of which 12.6% were incomplete (i.e., not all required parameters were measured). The median time between consecutive complete sets of measurement was 6.7 hours (IQR: 5.0-11.5). This time interval became lower with higher MEWS scores. A majority of the measurements (80.0%) was done during 4 periods of 2 hours, in accordance with the 4 daily measurements required by the protocol. The measurements taken during off-peak hours were associated with higher MEWS (the proportion of MEWS superior or equal to 3 increased from 18.3% during the nursing rounds to 31.3% outside) and a higher rate of incomplete observations (19.0%, compared to 11.0% during the rounds).




*[Fig1. Missing rates and points allocation]*




*[Fig2. Relationship MEWS/calculation frequency]*

**Conclusions:** The suboptimal frequency of MEWS measurement and the incompleteness of the observations are two hurdles that future systems should tackle by providing better clinical decision support, even with missing parameters.

**Reference:**

1. Subbe, C. P., Kruger, M., Rutherford, P., & Gemmel, L. (2001). Validation of a modified Early Warning Score in medical admissions. *Qjm*, *94*(10), 521-526.

## 14AP06-1

### Video simulation as a feedback tool from critical incident reporting systems

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**Background:** The security working group in Anaesthesia(GTSA)of the Hospital General Universitario Gregorio Marañón(HGUGM)i local member of the Spanish Reporting System in Safety in Anaesthesia and Resuscitation (SENSAR).The goal of the GTSA is the improvement of safety culture, with implications on the quality of the care of the surgical patient.
Our aim is to propose the video simulation as a feedback tool to overcome one of the biggest barriers to critical incidents (CI) reporting.As a secondary goal we wanted to describe GTSA activity since 2006.

**Material and methods:** This is a descriptive study with retrospective analysis of the activity of GTSA data from 2009 until 2014,obtained from the following sources:
- ANESTIC(database of SENSAR,2009-2014)
- Descriptive cross-sectional study.Attachments and Anaesthesia residents survey to determine the degree of compliance with recommendations for clinical practice of the Spanish Society of Anaesthesiology,Resuscitation and Pain Management(SEDAR)in the HGUGM (A.Garrido, 2006)
- Survey ANESTIC analysers on barriers to communication IC.
- Videosimulation material developed for training potencial communicators of CI or as feedback(GTSA,2014)

**Results:** The GTSA was established in April 2006.On October 2014 SENSAR included 82 hospitals,360 local analysers and a total of 4.710 CI communicated(shared by all hospitals). On April 2013 SENSAR conducted a survey among local analysers putting clear barriers to communication of IC. Despite its low statistical power by low rate of response(6.11%), the study was consistent with other published data,and they highlighted the absence of feedback as the main cause of lack of motivation when it comes to reporting.
As an improvement in the problem-based learning and based on evidence of the effectiveness of the technical teachers in simulation and debriefing, GTSA has developed different video simulation materials inspired by real cases from CI.
This material allows illustrating real incidents and their systematic analysis of latent factors. It also allows debriefing on Human Factors and training on Crisis Resource Management(CRM).

**Conclusion:** We propose video simulation as a tool to improve the feedback from critical incident reporting systems.Video simulation is useful tool to apply the andragogy principles and enhance learnig.We need larger studies to determine the efectiveness of these learning strategies and to probe its effect on the reduction of the CI as well as the morbi-mortality.

## 14AP06-2

### A qualitative study on reporting of critical airway incidents to a critical incident reporting system: reasons for underreporting

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**Background and Goal of Study:** Airway incidents are a leading cause of anaesthesia related morbidity and mortality (1), and little is known about the detection of structural or systemic weaknesses of airway management in anaesthesia departments (2). The reporting of near-misses to a departmental Critical Incident Reporting System (CIRS) is a good starting point to identify, structure, and address weaknesses, hereby improving quality. This study investigates which aspects motivate or impede anaesthesia providers to report a near-miss as a critical incident (CI) to a departmental CIRS.
**Materials and methods:** We prospectively recorded all airway events occurring in airway management procedures over a period of two months. We then screened these events to identify potential CIs that would qualify to be reported to the departmental CIRS. Finally, we conducted semi-structured interviews with the anaesthesia providers responsible when the CI occurred, in order to clarify the reasons for reporting or not reporting the CI. The interviews were analysed with the framework method (3).
**Results and discussion:** In a total of 3,670 airway management cases, 574 cases with one or more airway events occurred (15.6%). Of these, we identified 116 airway related CIs, while only one CI was reported to the departmental CIRS in the same period (<1%). The interviews uncovered misconceptions about the CIRS and a lack of feedback. When asked about criteria for a CI, individual mistakes were often exclusively mentioned. It was repeatedly unclear who should report a CI within a team. Additionally, providers only reported critical events when they felt that the reporting could prevent future incidents or illustrate a learning point. Taken together, this subsequently introduced a prohibitively high reporting threshold.
**Conclusions:** Screening all airway events showed significant underreporting of CIs to the departmental CIRS. Semi-structured interviews revealed misconceptions, leading to restricted reporting of CIs. Furthermore, we identified a need to improve feedback from the CIRS to highlight its benefits. We are convinced that the CIRS may contribute to identifying structural weaknesses, but if reporting to the CIRS does not embrace all relevant cases, very little will be learned to improve patient care.
**References:**
1. Peterson et al. Anesthesiology. 2005;103(1):33-9
2. Cook et al. Br J Anaesth. 2011;106(5):617-31
3. Gale NK et al. BMC medical research methodology. 2013;13:117

## 14AP06-3

### Incidents in obstetric anaesthesia: a five years analysis of SENSAR reports

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**Background and Goal of Study:** Certain factors might provide the "perfect storm" for and adverse obstetric incident; many events, usually unexpected, lead to rapid assembly of a team in what often appears to be a chaotic situation. "Spanish notification system on safety issues of anaesthesia and intensive care (SENSAR)" collects information on more than 5000 incidents from 86 Spanish hospitals. Local analysis of the incidents allows identification and prevention of errors and their contributing factors. We aimed to review the underlying factors that led to an obstetric incident and different actions implemented after the analysis.
**Materials and methods:** Data were collected retrospectively from all obstetric incidents reported to SENSAR database in the past 5 years.
**Results and discussion:** 100 incident reports were reviewed. The median age of patients was 32 years (95%CI 31,14-33,08). 61% were classified as ASA 1 (95%CI 50,7-71,1). Regional anaesthesia was the most commonly used technique (76%, 95%CI 66,4-84,2). The majority of incidents resulted in no harm to patients (72%, 95%CI 63,1-80,9). Most of the incidents (72%) were reported by medical specialists; directly responsible in 47%. The most frequent types of incidents were "clinical" (27%), "equipment related" (27%) and "medication error" (24%), being "equipment failure" the most recurrent subtype (12 cases). " Safety practice problem" was the most common active error (24%, 95%CI 15,5-32,5), whereas "safety culture related problem" (42%) and "communication error" (22%) were the most prevalent latent risk factors. 2 or more latent risk factors were present in 83% of incidents (95%CI 75,5-90,5), with a median of 3 latent risk factors and IQR 4. Lastly, measures were implemented in 96% of the cases, being "safety related session" the most common (63%).
**Conclusions:** Most of the patients that suffered an obstetric incident were young, ASA 1, and received regional anaesthesia. Contrary to what was expected, no time slot was associated with an increased risk and the urgency of the procedure was only involved in few cases. However, human factors like miscommunication and lack of safety awareness were involved in most cases, this highlights the importance of non technical skills training. Even thought the majority of incidents resulted in no harm, preventive measures were implemented in a high percentage. Incident reports and analysis can reduce risks and improve patient safety.

## 14AP06-4

### Communication and team working issues in 7 years critical incidents reported at Spanish Anaesthesia and Intensive Care National Incident Reporting System (SENSAR)

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**Background and Goal of Study:** Retrospective analysis of safety reporting systems has shown that in 20-30% of the cases communication errors or poor team working are present. 53.77% of the anaesthesia-related events resulting in death or permanent loss of function reviewed by the Joint Commission were related with communication errors although the majority of them had multiple root causes. Surgical briefings can ameliorate team working climate. The surgical safety checklist promoted by the World Health Organization is a good example of briefing that has proved a reduction in morbidity and mortality.
Our goal is to calculate the incidence of communication errors among the incidents reported to SENSAR (the Spanish Anaesthesia and Intensive Care National Incident Reporting System) from January 2009 till November 2015
**Materials and methods:** Review of the validated incidents reported to Anestic (data base of SENSAR).
**Results and discussion:** From January 2009 till November 2015, 5396n incidents were validated in Anestic. Although the majority of them had several contributing factors, 2819 incidents (52.24%) were related to team performance. Communication errors were found in incidents with team working contributing factors: communication between physicians (19.97%), and between physicians and other personnel (26.60%). Help issues were also found (3.58%). The incidence of the communication errors is similar to that reported by other authors. Implementation of a medical team training program has shown a reduction in surgical mortality. SENSAR in collaboration with Clínico San Carlos Hospital (Madrid, Spain) has implemented a team training program (SEGACI) addressed to anaesthetists, surgeons and nurses based in video simulation. The aim is to spread team working courses to as much hospitals as possible. The trainers will replicate the course at their working places and nearby hospitals. The program highlights non-technical skills, training Crisis Resource Management, the application of the surgical checklist and the principles of the Declaration of Helsinki.
**Conclusions:** 2819 incidents (52.24%) were related to team performance, although the majority of them had several contributing factors. SENSAR has contributed to the performance of a medical training program based in video simulation addressed to anaesthetists, surgeons and nurses, to spread team working courses in Spain.

## 14AP06-5

### Anesthesiology, critical care medicine and pain control at distance? Employ of telemedicine by Spanish military anesthesiologists

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**Background and Goal of Study:** The World Health Organization defines telemedicine as "the use of medical knowledge consultation when the distance is a determining factor using information and communications technology for the exchange of valid information for diagnosis, treatment and prevention of diseases and injuries, research and evaluation and continuing education of health professionals in order to provide health care to individuals and their communities. "
Military Medical Corps in order to support the medical officers deployed overseas have been pioneers in developing this technology. In Spain, in 1930 it was established the first Spanish Center Radiohealth consultations with a radio station located in a military hospital located in every Naval Department. Currently, the Telemedicine Unit of the Central Hospital of Defense "Gómez Ulla" Madrid (Spain) connects to all Spanish military units deployed in 15 different operations abroad.
The goal of the study is to analyze our anesthesiology, critical care medicine and pain experiences employing telemedicine from 2003 to 2015.
**Materials and methods:** Retrospective descriptive study from Telemedicine Service Central Hospital of Defense "Gómez Ulla" Madrid (Spain) database. The study period is limited to consultations between January 2003 to December 2013. Anesthesiology, Resuscitation and Pain Therapy consultations were extracted.
**Results and discussion:** During the period analyzed, 7915 teleconsultations from 4 continents and 5 oceans were performed. Of these, 380 were about emergency, 35 about critical care and 20 of them were about clinical investigation.Employing Telemedicine devices support to prehospital level, preanesthesia consultation, airway management (Storz®), regional anesthesia ultrasound guided, telesurgery, teleecocardiology and support for multiple trauma care were done by Spanish military anestesiologists.
**Conclusion(s):** Telemedicine is a valid tool for Anesthesiology, Critical Care Medicine and Pain Therapy. It can support to physician with other medical specialties and anesthesiologists who can be isolated, as can occur in the military environment.

## 14AP06-6

### Cardiac surgery related incidents in SENSAR

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**Background and Goal of Study:** It has been reported a higher incidence of adverse events among cardiac surgery patients; over half of these adverse events were considered preventable. "SENSAR" is a web-based reporting system that has gathered and analysed more than 5000 incidents from 86 Spanish hospitals. We aimed to examine incident contributing factors in cardiac surgery and preventive measures adopted after the analysis.
**Materials and methods:** Data were collected retrospectively from all incidents in cardiac surgery reported to SENSAR database.
**Results and discussion:** 136 incident reports were included. Median age of patients was 70 years (95%CI 60,45-67,17); 55% were male. Most patients were graded as ASA 3 or above (93%, 95%CI 88,3-97,7). General anaesthesia was performed in most cases (75%, 95%CI 67,4-82,6). 50% of reported incidents led to patient harm, 8% to death (95%CI 3,3-12,7) and 10% lengthened hospital stay more than 24h. Only physicians were involved in 53% of cases. Most incidents (89%) were reported by medical specialists; directly responsible 63%. 53% of incidents occurred in the OR. "Clinical" (32%) and "equipment related" (25%) were the main identified categories. " Safety practice problem" was the most common active error (42%), while "safety culture related problem" (38%) and "complex patient's pre-existing condition" (32%) were the most prevalent latent risk factors. 2 or more latent risk factors were present in 83% of cases (95%CI 75,5-90,5), with a median of 3 latent risk factors and IQR 4. Finally, measures were taken in 84% of the cases, being "safety related session" the most common (46%).
**Conclusion:** Most of the patients that suffered incidents during cardiac surgery were elderly, ASA 3 or above, and received general anaesthesia. Most cases occurred in the OR despite the fact that the patients only spent a brief time of his hospital stay in this area. Although harmful incidents were very frequent, only a low portion resulted in death or lengthened hospital stay. Clinical and equipment related errors were involved in a large number of cases. Human error was the major responsible for the events, contributing factors like absence of safety culture reflects the value of promoting patient safety among healthcare providers. While many incidents resulted in no harm, preventive measures were implemented in a high percentage of cases. Incident reporting can play a major role in developing strategies for improving patient safety.

## 14AP06-7

### Adverse events involved in liability claims of alleged anaesthesiology malpractice between 2001-2013

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**Background and Goal of Study:** Although anesthesiologists have been pioneers in patient safety interventions, professional liability claims are still a reality of great concern and the distribution of medico-legal claims in Catalonia (Spain) remains unknown in our field. The aim of our study is to identify areas of high medicolegal risk and describe infrequent but potentially harmful events leading to anesthesia-related injuries which could help to develop preventive strategies[1].
**Materials and methods:** We analysed the claims database of the Professional Liability Department of the Catalonian Council of Physicians' Official Colleges (PLD). It collects information from the main physician's professional liability insurance company in Catalonia. We performed a descriptive analysis of the most common events leading to a claim.
**Results and discussion:** We identified 146 cases. Alleged adverse event was typically surgery-linked (141 cases; 96.57%), mainly intraoperative (121 cases; 85.82%). The most frequently involved surgical fields were General Surgery (abdominal procedures), Orthopaedics (prostheses), and Obstetrics and Gynaecology (labour and delivery). Most non-surgery-linked cases regarded chronic pain-management. 23 claims concerned a clinical case resulting in a fatality (15.75%). The remaining 123 cases involved different forms of impairment (84.25%): traumatic dental damage (mainly during endotracheal intubation in dentures previously in poor condition), peripheral neurological impairment (mainly lower limbs disability after spinal anaesthesia) and severe central nervous system damage (mainly anoxic damage). The adverse event was attributed to an anaesthesiologist's practice defect in 38 cases (26.03%), reaching the 30.43% among those cases resulting in a fatality.
**Conclusions:** In our environment, adverse events in Anaesthesiology typically involve both severe damage (fatalities and severe impairment) and minimum damage (dental damage), but real medical error is involved in only a low percentage of claims. Nevertheless, the analysis of closed claims makes it possible to identify areas of high medico-legal risk and also frequent adverse events which should lead to the development of preventive strategies[2].
**References:**
1. Gómez-Duran E.L. Journal of Forensic and Legal Medicine 20(2013)442-446
2. Staender S.Eur JAnesthesiol 2011;28;85-91

## 14AP06-8

### Analysis of communication errors during on-pump coronary artery bypass grafting (CABG)

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**Background:** Communication failures are accepted as the most important causative factor of adverse events during surgery. Cardiac surgery, especially, requires numerous professionals to communicate to each other. The aim of this study was to investigate communication errors in conventional on-pump CABG operations, which is one of the most common adult open heart procedures, such that surgical staff are generally familiar with the procedure.
**Method:** Observations were carried out on 50 elective on-pump CABG cases that were performed by multiple surgeons. The observations were taken by an anaesthetic fellow over a 3 month study period, at the National Heart Institute of Malaysia. All communication failure events were documented[1], from administration of heparin to chest closure; where all team members were present in the operating theatre. The errors observed were grouped by the seniority, and category, of the professionals involved in the error. The errors were then categorised into the type of communication error (purpose, omission, occasion, audience, and context)[1], and also that of human error (mistake, lapse, slip, and violation)[2].
**Result:** A total of 119 communication error-related events were observed (mean; 2.38 errors per case). Surgeons were most involved with 90 errors (75.6%), perfusionists 47 (39.5%), anaesthetists 45 (37.8%), scrub nurses' 17 (14.3%), and circulating nurses' 14 (11.8%). By seniority; senior staff were involved in more errors than juniors (102 errors, 85.7% vs. 51, 42.9%). By communication error type; "purpose failures" (the intended outcome of the communication was not achieved) were seen the most at 80 events (67.2%). By human error type; "lapse" was most common with 74 incidents (62.2%), then "slip"/"violation" with 27 (22.7%). Physicians caused 74.1% (20 events) of slip/violation errors; junior members caused more than senior (56.5% vs. 43.5%). Two slip/violation errors, by non-physicians, could have caused serious intraoperative accidents. More than 80% of errors happened in "standerdised" phrases in the CABG procedure.
**Conclusion:** Communication errors were identified in most of on-pump CABG cases, and most were during routine work. Senior members and physicians were more involved, while juniors and non-physicians were more likely to cause slip/violation errors, which could be hazardous.
**References:**
1. Lingard, Lorelei, et al. Qual Saf Health Care. 2004 Oct;13(5):330-4.
2. Reason. Human error. Cambridge university press, 1990.

## 14AP06-9

### Critical incident reporting in theatres and intensive care in a general hospital in the UK

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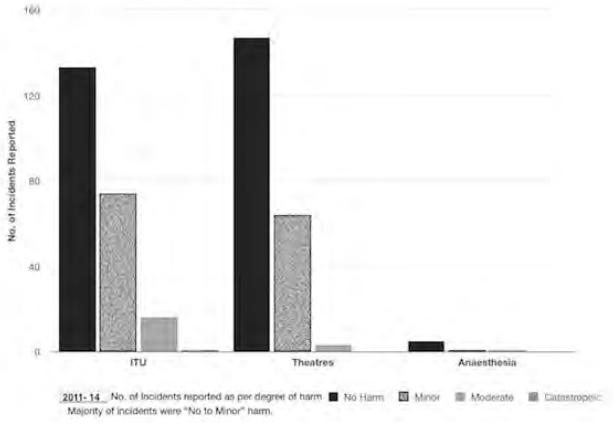
**Background and Goal of Study:** Critical incidents are unintended outcomes or events, which could have or did reduce the safety margin for the patient during their hospital stay. Every year ~900,000 incidents are reported around NHS care, ~2000 of which results in death. Additional hospital stay costs are approximately £2 billion a year and negligence claims amount to £400 million a year. Clinical risk management aims to reduce incidence of harm to patients. However, its efficiency relies on reporting of critical incidence to the local or national database.
We aim to identify the number of critical incidents related to anaesthesia from operating theatres (OT) and also from intensive care unit (ICU) for recent three years at James Paget University Hospital.
**Method:** We interrogated the local reporting system tool ('safeguard') to isolate the incidents relevant to anaesthesia, OT and ICU from Nov 2011 to Oct 2014. Incidents were classified based on the outcome and severity of 'harm' (no/minor/major harm).
**Results:** Relatively less incidences had been reported under 'anaesthesia' (mean = 7 /year) compared to OT (215/year) and ICU (225/year). Based on the severity of harm, most incidents reported in all three departments were "no to minor" harm. The cause for majority of incidents in OT was reported under 'health and safety' while that in ICU was 'tissue viability'.




*[Critical incident reporting]*

**Conclusion(s):** This wide disparity in the number of incidents reported among these groups could be due to various reasons: some anaesthesia incidents being classified under 'OT'; 'low reporting' of incidents by anaesthetists; fear of identification. By creating an awareness campaign, we hope to promote an open and transparent culture within the organisation to improve patient safety and quality of healthcare.
**References:**
1. S Reed et al. National critical incident reporting systems: European survey; BJA 2014; 112:546-55
2. R P Mahajan. Critical Incident Reporting and Learning; BJA 2010; 105 :69-75
3. Safe Anaesthesia Liaison Group
4. National Patient Safety Agency

## 14AP06-10

### More than 5000 critical incidents to learn from: local and national review in Spain

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**Background and Goal of Study:** In this paper we would like to present The Safety Working Group In Anaesthesia (GTSA) activity since 2006 and emphasize the milestone of 6174 incidents in the Spanish Anaesthesia and Reanimation Incident Reporting System (SENSAR-ANESTIC) database. The GTSA is an expert committee of Hospital Universitario Gregorio Marañón (HGUGM) in Madrid. It was established to improve and to promote safety in daily practice and safety culture. The group activity is based on the SENSAR-ANESTIC database, where critical incidents are reported. Critical incident (CI) is defined as event or circumstances that caused or could have caused unnecessary harm to a patient. It may have been originated from intentional or unintentional acts. The staff analyses the facts and proposes measures following the modern non-punitive approach allowing learn from them, designs system improvements and removes latent contributory factors.
**Materials and methods:** We present a descriptive and retrospective analysis of GTSA and SENSAR-ANESTIC activity. Data is collected from: SENSAR-ANESTIC national database (since 2009).
**Results and discussion:** The Spanish national group SENSAR- ANESTIC currently includes 85 hospitals and thanks to the work of hundreds of analysers (396) analysed 6174 CI and proposed at least 9,900 corrective measures. 668 of those CI belong to HGUGM corresponding to 10,81% from the total, several corrective measures has been proposed as well (email alerts, newsletters, bibliographic reviews and periodic dissemination of results, annual courses and video-simulation training). The main value of the system is to have been the vehicle of insertion of a safety modern culture in areas in which it is used. A fair, transparent and diligent safety culture focused on system failure and feedback learning.
**Conclusion(s):** The number of CI grows exponentially nationwide as a learning source to improve the safety culture. The GTSA contributes significantly to the total of CI. Based on previous publications the idea of higher reporting CI rates associated with a more positive safety culture, we think that this working group has helped to improve the safety culture at the local level.

**Reference:**
Hutchinson A, Young TA, Cooper KL et al. Trends in healthcare incident reporting and relationship to safety and quality data in acute hospitals: results from national reporting and learning system Qual Saf Health Care 2009; 18:5-10

## 14AP06-11

### Confidentiality of patient information: a survey of operating theatre changing rooms

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**Background and Goals:** Confidential information relating to a patient could include items such as their names, date of birth, address or other identifiable post code, hospital or NHS numbers and the surgical procedure planned (in case they are going for surgery).
All these items are present every day in the NHS in printed Operating Theatre Lists, copies of which are frequently carried by medical staff including doctors, nurses, operating practitioners and others.
This is an issue in Operating Department Changing Rooms (CR), as information may be available to staff who it does not need to be shared with under Caldicott principles. It is also about not maintaining (and not destroying) patient records/information correctly. Despite the CR being a clinical only area, there is still a large amount of traffic.
**Materials and methods:** Data was collected from the CR for a two week period in Nov 2015.
One of us would attend to the CR at the same time each day (usually at close of day). We would also have a look at any time we went into the CR areas. Theatre staff were also surveyed for their experiences.
**Results and discussion:** Of the 14 sessions surveyed, patient specific information was found on 6.
This ranged from complete Theatre lists to handover documents and GP (general practitioner) referrals with specific details. Some of the detail available was quite sensitive.
**Conclusions:** This is clearly not a 'one off' matter. Any breach of patient confidentiality is a matter of concern to all medical personnel.
A simple suggestion would be to have ,confidential waste' bins in each CR to encourage staff to dispose of their patient identifiable information appropriately on changing/going out of the Theatre complex. This could be reinforced by having laminated posters about the need to use the same bins displayed prominently at all entry and exit points in Theatres.

# Geriatric Anaesthesiology

## 15AP01-1

### Perioperative hypotension in non-critically injured geriatric trauma patients

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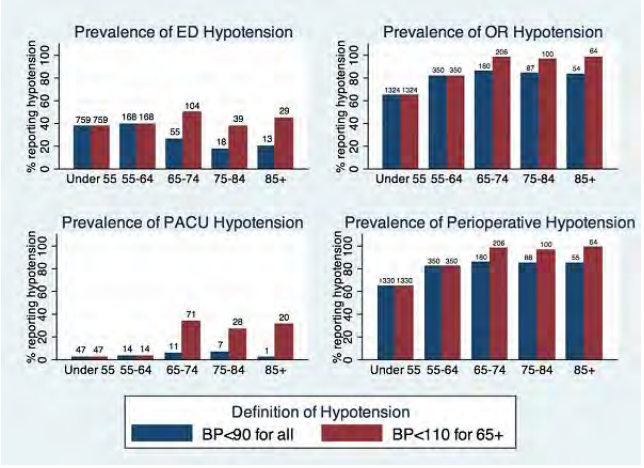
**Background:** There are no data on immediate peri-operative complications in non-critically injured elderly trauma patients. We postulated that the burden of perioperative hypotension, need for intensive care unit (ICU) admission, and post anesthesia care unit (PACU) recovery time is high, even among non-critically injured elderly patients.
**Methods:** A retrospective study of elderly non-critically ill patients who received anesthesia care for trauma procedures and expected PACU recovery was conducted at Harborview Medical Center, a level 1 trauma center in Seattle, Washington, between 1/5/2012 and 30/11/2013. Perioperative (intra-operative and PACU) systolic hypotension was the main outcome and was defined in two ways: 1) systolic blood pressure (SBP) <90mmHg for all patients and 2) SBP <110mmHg for patients > 65 years. The main exposure was age and was modeled both as a continuous variable and by age category (<55, 55-64, 65-74, 75-84, 85+ years) based on the National Study on Cost and Outcomes after Trauma.
**Results and discussion:** 2,863 patients were included; 380 (13%) were >=65 years old. Mean Injury Severity Scores (ISS) were 7.9 - 11.6. Intraoperative hypotension in the 65+ group was >80% using SBP definition 1 and >95% using definition 2. PACU hypotension in the 65 and over group occurred in 2.8-3.2% and 26.9%-33.7%, respectively. ICU need increased from 11.9% in the <55 group to 32.2% in the >85 group. There was no significant difference in PACU supervision time or ICU length of stay by age group. Over 50% of patients in the 75-84 and >85 groups were discharged to a skilled nursing facility.




*[Cumulative hypotension by setting]*

**Conclusions:** Peri-operative hypotension is common among non-critically injured trauma patients, and elderly patients are frequently discharged to a skilled nursing facility. Strategies to reduce these adverse outcomes in elderly trauma patients are urgently needed.

## 15AP01-3

### Alzheimer's disease and anaesthesia - a case report

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**Background:** Alzheimer's disease (AD) is a neurodegenerative disorder and the most common form of dementia. Exposure to drugs has been proposed as a major factor in the genesis and evolution of dementia, including AD. This case report describes an AD patient and her clinical evolution following general anaesthesia and surgery.
**Case report:** A 76-year old female patient with AD was submitted to hysterectomy for endometrial cancer. The patient was admitted to the operating room awake and was submitted to general anaesthesia with remifentanil and propofol (effector site) until attaining a BIS of 40, then given cisatracurium and intubated, with monitoring of cardioscopy, $SpO_2$, NIBP and BIS. Spinal anaesthesia was performed with morphine (80$\mu$g) for postoperative analgesia. The HR was 86-65 bpm, BP was 180-105 mmHg (systolic) and 92-60 mmHg (diastolic), with no need for vasoactive drugs, but the burst suppression rate was $\neq 0$ (15-39) from the beginning of induction, with low BIS values, despite low target of anesthetics.
After the procedure, the patient emerged peacefully, was extubated and transferred to the ICU. Bromazepam (6 mg) was administered on the second postoperative day, after which the patient went into hypoactive delirium and then a diagnosis of non-convulsive status epilepticus was stablished. A typical EEG pattern was observed, with discharges and spikes bilaterally in the temporal-occipital region and triphasic waves characteristic of advanced dementia. The patient remained in coma despite treatment with phenytoin until her death on the 25th postoperative day.
**Discussion:** Although the real impact on brain function remains unclear, it seems that anesthetics influence AD neuropathology at multiple levels in the involved pathways. Studies have shown that some drugs( volatile anesthetics, benzodiazepines, anticholinergics and antibiotics) may contribute to these changes.
**Reference:**
Bittner E, Xie Z. Brief review: anesthetic neurotoxity in the elderly, cognitive dysfunction and Alzheimer's disease. Can J Anesth,2011;58:216-23
**Learning points:** Seniors represent a significant proportion of the surgical population and require careful management with proper anesthetic approach and intraoperative cerebral monitoring, avoiding excessive depth of anesthesia.

## 15AP01-4

### Effect-site concentration of remifentanil for preventing cough during emergence in elderly patients: a comparison with adult patients

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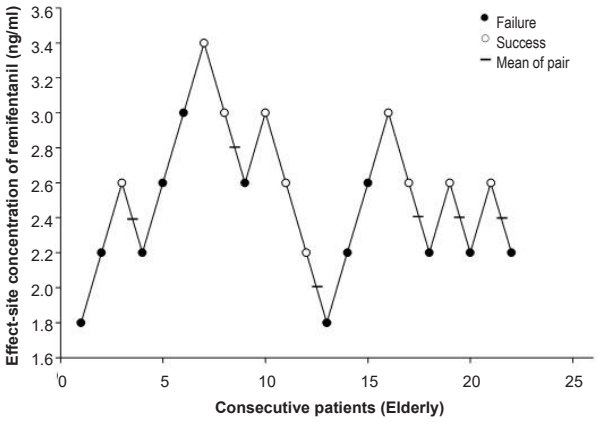
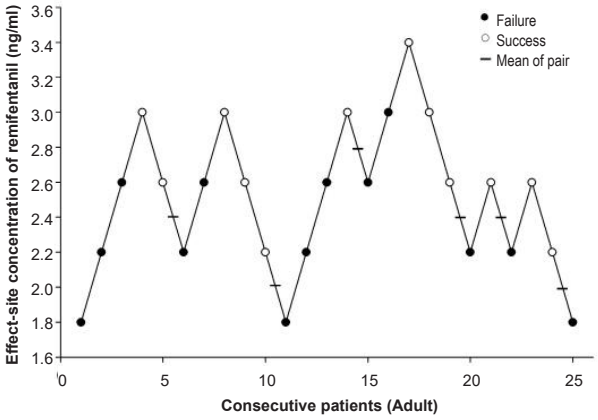
**Background and Goal of Study:** Prevention of cough during emergence after nasal surgery is important to avoid bleeding from the surgical site. We designed this study to investigate remifentanil effect-site concentration in 50% of patients (EC50) for smooth emergence without cough in elderly patients, and to compare it with that in adult patients undergoing nasal surgery.
**Materials and methods:** Twenty-two elderly patients (65-80 yrs) and 25 adult patients (20-60 yrs) with ASA physical status I or II undergoing nasal surgery were enrolled in this study. Anaesthesia was maintained with sevoflurane and remifentanil. EC50 and EC95 of remifentanil for preventing cough were determined using modified Dixon's up-and-down method and isotonic regression method with bootstrapping approach. In addition, recovery profiles were recorded.
**Results and discussion:** Using the Dixon's up and down method, EC50 of remifentanil in elderly group (2.40 ± 0.0.25 ng/ml) were not significantly different in the adult group (2.33 ± 0.30 ng/ml) (p=0.687). Using isotonic regression, EC95 (95% CI) of remifentanil in elderly group [3.32 (3.06-3.38) ng/ml] were not significantly different in the adult group [3.30 (2.96-3.37) ng/ml]. However, eye opening time (14.1 ± 3.8 s vs. 12.0 ± 2.9 s), extubation time (17.2 ± 4.1 s vs. 14.0 ± 3.0 s), and PACU stay (44.5 ± 7.6 min vs. 38.7 ± 3.4 min) in the elderly group was significantly longer than in the adult group. (all ps<0.05).
**Conclusion(s):** In the elderly patients, effect-site concentration of remifentanil for preventing cough after nasal surgery from sevoflurane anaesthesia did not differ in the adult patients. However, delayed awakening and respiratory adverse events might warrant special attention in the elderly patients.




*[Up and down response]*

## 15AP01-5

### Changes in the endothelial function in elderly patients after anaesthesia

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**Background and Goal of Study:** Increase in the number of elderly patients is a serious problem for anesthesiology. These patients are characterized by a number of comorbidities, especially cardiovascular disease (CVD). This increases the operational risk and the development of perioperative complications. The synthesis of endothelin-1 (ET-1) determines endothelial dysfunction is a trigger in the pathogenesis of CVD. ET-1 has deleterious effect on the heart, can lead to cardiac complications in the perioperative period. The goal of our study was to examine and evaluate endothelial function in elderly patients with concomitant CV pathology after general anaesthesia.
**Material and methods:** We examined 55 patients aged 60 to 82 years for abdominal surgery. Patients were divided into 2 groups according to gender - a subgroup of women (n=22) and men (n=23). There were representative of the gender, age, ASA, BMI. Comorbidities were accounted for systems. Preoperative patients with CVD managed in accordance with ESC Guidelines (2014). ET-1 in EDTA-plasma determined by enzyme immunoassay (set Biomedica). Data are presented as M±m, statistically significant value of p<0,05.
**Results and discussion:** The severity of the patients corresponded to 58% of ASA II, 42% - ASA III. We compared the levels of ET-1 in elderly patients with CVD. In the preoperative period the level of ET-1 in all patients was increased by 45% compared to the reference values up to 0,556±0,02 fmol/

ml. Increased levels of marker and 1 day after anaesthesia. In a subgroup of men it was higher than in women (0,698±0,03 and 0,583±0,9 fmol/ml, respectively). By the 5 day the level of ET-1 in both groups significantly decreased to preoperative baseline to 0,582±0,013 fmol/ml, but did not reach the reference values.
**Conclusion:** Elderly patients with concomitant CVD showed a significant increase in the level of ET-1 in plasma, indicating the presence of endothelial dysfunction. In the early postoperative period, the vascular endothelium responds release vasoconstrictor marker to the operative trauma, and men more. By the 5 day of the postoperative period, signs of endothelial dysfunction in elderly patients were reduced but not disappear completely.

## 15AP01-6

### Comprehensive preoperative assessment of elderly patients: a challenge for the anesthesiologist

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**Background and Goal of Study:** To evaluate the relationship between the preoperative assessment guide of the Catalan Society of Anesthesiology and the Catalan Society of Geriatrics (SCARTD and SCGiG) in the elderly patient, with morbidity and mortality after surgery of moderate to high risk.
**Materials and methods:** Prospective observational study in patients aged > 70 years or > 60 years with associated co-morbidity scheduled for elective surgery of moderate to high aggressiveness. Data were collected from 60 patients in the preoperative visit to whom the Katz questionnaires, Pfeiffer Test or Short Portable Mental Status Questionnaire (SPMSQ) and Mini-Nutritional Assessment Short Form (MNA-SF) were administered in order to assess respectively their functional, cognitive and nutrition status, with a follow-up 30 days after the intervention.The studied variables included: demographic data, post-operative cognitive dysfunction (POCD), respiratory complications, cardiovascular, local and systemic infection, renal failure, endocrine-metabolic complications, hospital stay, mortality and readmission at 30 days.
**Results:** The average age of the sample was 82 ± 8 years and 60% were women. Statistically a significant association between the MNA-SF and 30-day mortality was found, as well as a relationship between the Pfeiffer Test, Katz and POCD and between the Pfeiffer Test, the ASA grade, the MNA-SF and the rate of readmission at 30 days ($p < 0.05$).
**Conclusion:** The scores included in the preoperative assessment guide in patients of advanced age of SCARTD and SCGiG seem to be related to the rate of postoperative complications, mortality and readmission rate within 30 days.

## 15AP01-7

### Predisposing factors and morbidity associated with blood transfusion in elderly patients involved hip fracture

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**Background and Goal of Study:** Hip fracture represents a problem in the elderly because of its high incidence and mortality. A significant number of patients will require blood transfusion(1). Exists clear association between transfusion and increased postoperative complications(2).
The aim of our study is to identify the predisposing factors to blood transfusion and the complications associated.
**Materials and methods:** Institutional protocol for audit the hip fracture surgery procedure, involved in the quality program of our hospital. Were included all patients undergoing hip fracture surgery from June1st to December 31th, 2014. Medical history, antiplatelet or oral anticoagulants treatment, haematinics on admission and serial complete blood counts, surgical delay time, type of anesthesia, type of fracture, surgical technique, transfusion requirements and postoperative complications were collected.
A bivariate analysis was used; the chi-square test for qualitative variables and t-Student for quantitative.
**Results and discussion:** We included 182 patients with hip fracture with a mean age of 84± 6.8 years. 80% were women and 60% ASA≥III. Around 65% were extracapsular fracture. The surgical technique used was intramedullary nailing (48%), Moore's prosthesis (22%), DHS (16%) and total hip replacement (12%). The average delay in surgery was 3.2 days. The pre and postoperative hemoglobin average was 11.5 and 9.8 g/dl respectively. The transfusion rate was 59%, administered an average of 1.4 units of packed red blood cells per patient. Predisposing factors for transfusion were age, hemoglobin at admission, pre and post surgery, ASA, GFR <60mL/min/1,73m2 and the surgical technique. No statistically significant differences were found between transfusion and sex or prior antiplatelet or anticoagulant therapy.
Blood transfusion was associated with increased number of renal postoperative complications (84%, p=0,001) and respiratory infections (80%, p=0,04). No statistical association was found with surgical wound infections, cardiac or neurological complications.
**Conclusions:** Almost 60% of patients required blood transfusion. Age, ASA, perioperative anemia, kidney failure and surgical technique were predisposing factors for transfusion. Transfused patients had higher postoperative complications, especially infections respiratory and renal failure.
**References:**
1. García-Ercea JA et al. MedClin(Barc)2003;120(5):161-6.
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## 15AP01-8

### Age-related changes in electroencephalographic activity during anesthesia - a case report

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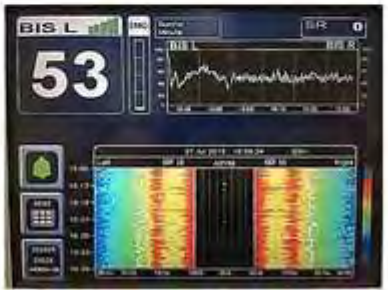
**Background:** Age-related neurophysiological and neuroanatomical changes make the CNS more susceptible to anesthetics. EEG monitoring reveals a significant power reduction in all frequency bands, especially the alpha band, as shown by spectrogram, and a greater frequency of episodes of burst suppression. Some authors have hypothesized an association between the vulnerability of the senile brain to anesthetics and increasing frequency of postoperative delirium and cognitive disorder. In this study, we demonstrate the usefulness of monitoring the CNS in elderly surgical patients with regard to postoperative neurological outome.


*[Spectrogram]*

**Case report:** A 92-year old woman (60kg, 1.50 m, P2) medicated with citalopram [J1] (10 mg/day), with a history of mild dementia and a mini-mental state exam (MMSE) score of 20, was submitted to orificial surgery under general anesthesia with remifentanil, propofol (induction) and desflurane (maintenance). BIS was kept between 50 and 60 and burst suppression was kept at 0 (avoiding deep anesthesia and the reduction of mean blood pressure

by more than 10% of baseline). The spectrogram revealed low power and bilateral absence of alpha-band hypersynchronization. Surgery lasted 2 hours and the patient was transferred (extubated and aware) to the post-anesthetic recovery room. No delirium was observed in the immediate postoperative period. The cognitive function score (MMSE=22) was higher at 3 months than at baseline.
**Discussion:** EEG monitoring (using spectrogram as a parameter of low neuronal reserve), control of burst suppression (avoiding or minimizing burst suppression) and avoidance of deep anesthesia appear to be a good strategy to prevent unfavorable neurological outcomes in elderly surgical patients. More research on the anesthetic requirements of the normally aging brain is necessary.
**Reference:**
Purdon PL, Pavone KJ, Akejo D, et al. Age-dependent changes in the electroencephalogram during propofol and sevoflurane general anaesthesia. Br J Anaesth 2015;115,Suppl1:i46-i57
**Learning points:** EEG analysis and the spectrogram can facilitate individualized patient care by revealing patient's brain state.

## 15AP01-9

### Perioperative goal-directed hemodynamic optimization using the noninvasive CNAP™ monitoring device in high-risk hip fracture patients

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**Background and Goal of Study:** In the last years, there is a growing interest in the improvement of prognosis and shortening of hospital length of stay in high-risk surgical patients. Several evidence-based protocols ("fast-track" surgery) have been developed and implemented in some hospitals for this purpose. Cardiovascular optimization through the so-called "goal-directed therapy" (GDT) is a key element in these protocols. Previous studies in the literature use invasive monitors to assess hemodynamics.
The aim of the present randomized, multi-center, open-label clinical trial is to use a GDT protocol (including fluid boluses and vasoactive drug infusion) based on data obtained from the CNAP™ device (systolic volume, cardiac index and mean arterial pressure) to test the hypothesis that GDT is superior to standard practice in terms of reduction in the incidence of perioperative complications. Only we present in this abstract the preliminary study to evaluate the embodiment feasibility.
**Materials and methods:** A total number of 212 patients has been estimated for this study. All patients scheduled for hip surgery secondary to fracture, and who present at least, one risk factor (Age $\geq$ 80 years**,** New York Association Score (NYHA) III/IV and American Society of Anesthesiologists score(ASA) III/IV) will be included**.** All patients will followed from the day of surgery up to hospital discharge (determined by a specialist surgeon not involved in the study) or death.
**Results and discussion:** In this preliminary study 5 patients were included. The mean age was 85 (101/81), all patients were ASA III. The hemodynamic protocol (cristalloids, colloids and vasoactive drugs guided by hemodynamic monitoring) were applied in all patients. Only 1 patient required dobutamin and no one noradrenaline. All patients needed at least 1 bolus of 250 ml crystalloids.
The average value of cardiac index and medium arterial pressure before the spine anesthesia was 3,1 and 98. All were carried to the Post Anesthetic Care Unit (PACU) and after discharged between 4 and 6 hours. 1 patient present acute renal failure at day 3 and 1 patient die at the day 5, considering the surgery like day 1. The medium hospital stay was 6 days.
**Conclusion:** In our centre the study would be possible to do. Is possible that hemodynamic optimization guided by objectives can reduce perioperative complications in this group of patients.

## 15AP01-10

### Predicting the risk for postoperative retention after hemorrhoidectomy in elderly patients

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**Background and Goal of Study:** Elderly patients who require surgical interventions often have multiple comorbidities that complicate their intraoperative and postoperative care. Urinary retention is a common complication following haemorrhoidectomy.
**Materials and methods:** The objective of this study was to identify the risk factors for urinary retention after hemorrhoidectomy in elderly patients. With the approval of Medstar 2000 Ethics Board, data were collected from 72 charts of patients aged 65 and older, who underwent hemorrhoidectomy from January 1, 2015, to June 30, 2015.
The outcome was urinary retention in the first 24 hours after surgery. Risk factors were identified using multivariable logistic regression, and they were expressed as odds ratios or 95% confidence intervals.
**Results and discussion:** The overall urinary retention rate was 36.11% (n = 26). Significant risk factors associated with postoperative urinary retention included female gender, anesthesia methods, severity of hemorrhoid, a large amount of intravenous fluid administered perioperatively, and length of hospital stay.
**Conclusion(s):** Logistic regression analysis revealed that female gender (odds ratio, 1.805; p <.01), sacral anesthesia (odds ratio, 1.481; p = .02), more than 3 hemorrhoids resected (odds ratio, 1.523; p <.01), hemorrhoids having 4 degrees of severity (odds ratio, 2.001; p <.01), intravenous fluids >700 ml (odds ratio, 1.392; p = .02), and length of stay more than 7 days (odds ratio, 1.552; p <.01) were significant predictors of urinary retention posthemorrhoidectomy in elderly patients.

## 15AP01-11

### Bone cement implantation syndrome: a catastrophic event

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**Background:** Cement embolism is a rare but potentially catastrophic complication in orthopaedic surgery. Its clinical presentation can be diverse, ranging from moderate hypotension/hypoxia to full-blown cardiocirculatory collapse. We present one such case.
**Case report:** 83-year-old, ASA 2 female patient submitted to partial hip replacement for femoral neck fracture under combined general anaesthesia.
1h45min into the surgery, just after cementation of the femoral component, the patient develops cardiocirculatory arrest (asystole) and ALS is started. Return of spontaneous circulation is achieved in 2 cycles, and both an arterial and a central line are put in place, with a noradrenalin perfusion being started as the surgeons strive to close the operating wound.
30 minutes later pulseless electrical activity develops, reverting after 4 cycles of ALS, but the patient remains unstable, with a new episode of pulseless electrical activity 20 minutes later (reverting in 3 cycles) and yet another in a further 20 minutes (reverting in 2 cycles). Fluoroscopy to ascertain whether there might be a complication related to the central line evidences a properly placed CVC but a marked radiopaque heterogeneity in the region corresponding to the right atrium and possibly right pulmonary hylum.
An emergency TTE shows marked RV dilation and systolic disfunction, paradoxal movement of the interventricular septum and tricuspid regurgitation, neither of which were present preoperatively. Mobile echoreflective structures are also seen inside the RV. Supportive treatment is escalated but there is progressive clinical deterioration, with death being pronounced 2h38min after the initial cardiac arrest.
**Discussion:** Whereas a moderate degree of embolism in a healthy patient can usually be managed conservatively with adequate fluid therapy and vasoactive medications, a massive embolism in a patient with poor cardiac reserve has a very limited prognosis.
The fact that cardiac arrest was the first clinical manifestation within minutes of cement placement supports the idea of a massive embolism, with fluoroscopy and especially echocardiography providing further vital data for patient management.

**Learning points:** Bone cement implantation syndrome is a potentially serious complication that should be readily recognized and addressed to maximize survival. However, when faced with a massive embolism in patients with limited cardiac reserve, therapeutic options are limited and prognosis grim.

## 15AP02-1

### Observation on the effect of restrictive transfusion in colon cancer surgery in elderly patients for postoperative ventilator-associated pneumonia

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**Background and Goal of Study:** To observe the effect of restrictive transfusion in colon cancer surgery in elderly patients for postoperative ventilator-associated pneumonia(VAP).
**Materials and methods:** 40 cases of colon cancer in elderly patients intended to impose surgery were randomly divided into restrictive transfusion group and standard transfusion group, 20 cases in each group. In the restricted group, patients were administered one third of accumulative fluid loss in the first 60 minute, then the infusion rate were 4ml/kg/h, central venous pressure was maintained at 5-7cm $H_2O$. In the standard group, rate of fluid administra tion=CVE+deficit+maintenance+loss+third space. Blood gas index: lactic acid and volumes of fluid administered, blood loss, urine volume and thoracic fluid count (TFC) were recorded in the operation. Clinical pulmonary infection score(CPIS) was recorded respectively before operation, 1day, 3 day,7day after operation to evaluate the risk of VAP.
**Results and discussion:** Compare with group S, the TFC and intraoperative volumes of fluid administration were significant lower in group R. The CPIS was significant lower at day1,day3,day7 after operation in group R. There were no significant difference in MAP, HR, CO and urine volume between the two groups.
**Conclusion(s):** In colon cancer surgery in elderly patients, restrictive transfusion can maintain hemodynamic stability, ensure the tissue oxygenation, reduce conjunction edema, shorten the recovery time and hospital stay time. Restrictive transfusion can reduce the incidence of VAP.

## 15AP02-2

### Delirium in TURBT postoperative, more confusion than usual

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Postoperative delirium is a common complication with an incidence of up to 80%. In elderly patients it is usually undervalued even though it is often the first indicator of underlying serious complications. Bladder perforation, although rare - 0.025% - is a complication that should not be forgotten in the postoperative period of transurethral resection of bladder tumor (TURBT). We present an 80-year-old male with a history of ischemic heart disease, hypertrophic cardiomyopathy, hypertension, chronic bronchitis and hiatus hernia who underwent elective TURBT surgery under general anesthesia.
An hour after the end of surgery he started developing psychomotor agitation, disorientation and dyspnea. There weren't any changes on physical examination despite progressive worsening of delirium and a slight desaturation on pulse oximetry, tachycardia and hypertension.
After 30min we noticed a huge increase in abdominal girth and retention of the bladder irrigation fluid. Abdominal ultrasound showed a large amount of fluid in the abdominal cavity. The patient returned to the operating room for an emergent exploratory laparotomy in which a bladder perforation was corrected.
In this second postoperative period there was a new episode of delirium, also with an initially unremarkable physical examamination except for bilateral crackles on lung bases. Hemodynamic instability arised after 1h. We admited an acute pulmonar edema and treated the patient with furosemide, and nitrates which led to both hemodynamic and auscultation improvement.
Postoperative delirium may be a nonspecific finding but it should serve as a warning sign especially in geriatric patients. Interestingly in this case two serious complications, medical and surgical, first presented with delirium. This prompted a careful physical examination and led to an opportune diagnosis.

## 15AP02-3

### Preoperative anemia and postoperative morbidity in patients with hip fracture surgery

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**Background and Goal of Study:** About 30-40% of the patients with hip fracture have preoperative anemia and 10% severe anemia[1]. Preoperative anemia is an independent predictor of mortality in surgical patients[2]. The aim of this study is to determine the relationship between preoperative anemia and postoperative morbidity and which are the risk factors associated to preoperative anemia.
**Materials and methods:** Institutional protocol for audit the hip fracture surgery procedure, involved in the quality program of our hospital. Were included all patients undergoing hip fracture surgery from June1st to December31th, 2014. We collected demographics data, comorbidity, oral anticoagulants or antiplatelet therapy, complete blood cell count and hematinic levels, delay of surgery, type of anesthesia, type of fracture, transfusion rate, hospital length stay and complications. The preoperative anemia cohort was compared against the cohort without anemia.
A descriptive and bivariate analysis was performed using the Student's T-test for quantitative variables and Pearson's chi-squared test for qualitative variables. A value of $p<0.05$ was considered statistically significant.
**Results and discussion:** We included 182 patients. Average age was 84±7 years old, 80% women and 60% ASA III-IV. About 44% of patients had preoperative anemia and 20.7% preoperative iron deficiency. The transfusion rate was 59%. Preoperative anemia was significantly associated with female gender ($p=0.001$) and low glomerular filtration rate (81% anemic versus 35.6% without anemia; $p= 0.001$), but not with age or worse ASA. Anemic patients were transfused twice ($p=0.001$). The delay in surgery was higher in anemic patients (3.8 versus 2.7 days; $p=0.001$). The hemoglobin levels were lower in preoperative anemic patients ($p=0.001$). Anemic patients had more cardiac complications (28% versus 15%; $p=0.004$), but not respiratory, infectious, neurological or renal complications.
**Conclusions:** The prevalence of anemia in this patients is high and conditioned a high transfusion rate. Female gender and preoperative renal failure were predisposing factors but, surprisingly, not age or worse ASA. Anemia resulted in a significant increase of cardiovascular complications. The treatment of anemia could improve perioperative transfusion rate and postoperative morbidity in this type of surgery.
**References:**
1. Wiles MD et al. BrJAnaesth.2011;106(4):501-504.
2. Maxwell MJ et al. BrJAnaesth. 2008;101(4):511-517.

## 15AP02-4

### Perioperative factors of organ dysfunction and 6 months mortality in elderly patients undergoing major gastrointestinal oncological surgery

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**Background and Goal of Study:** More than half of gastrointestinal (GI) cancers occur in elderly patients. The effectiveness of curative surgery motivates surgical therapy when relevant. The goal of this study was to evaluate the rate of postoperative organ failures, the death rate at 6 months and its risk factors in elderly patients undergoing GI oncological surgery.
**Materials and methods:** This was a retrospective analysis of patients over 70 years old who underwent GI oncological surgeries between January 2009 and October 2012 in the University Hospital of Lille. Perioperative data were collected, including data from an Anaesthesia Information Management System (AIMS) database regarding the anaesthesiological procedure. The triple low state, known as Mean Arterial Pressure (MAP) below 75 mmHg, Minimum Alveolar Concentration (MAC) below 0.8 and a deep hypnosis (here defined as a State Entropy (SE) below 40), was also recorded (1). Data were shown as mean ± Standard Deviation or as a percentage. 6 months mortality perioperative factors were analysed by a stepwise multiple regression analysis. $P<0.05$ was considered as significant.

**Results and discussion:** Among 239 patients included, the surgery was performed for colorectal, gastric and/or oesophageal and pancreatic cancers in respectively 115 (48.1%), 74 (31%) and 43 (18%) elderly patients. The mean age was 77.1 years (±5.1). 26 patients (10.9%) were over 85 years old. 6 months mortality was 17.1% with development of postoperative organ failures in 49.4% of patients. In the subgroup over 85 years old, 6 months mortality was 34.6%. Mortality and morbidity predictive risk factors are presented in Table 1. No preoperative data was predictive of morbidity or mortality.

| 6 months mortality factors | Hazard Ratio | CI 95% | p |
|---|---|---|---|
| Age | 1.08 | [1.03-1.14] | 0.003 |
| MAP<60mmHg | 2.77 | [1.32-5.78] | 0.0068 |
| Postoperative organ failure | 5 | [2.2-11.4] | 0.0001 |
| **Postoperative organ failure factors** | **Odds Ratio** | **CI 95%** | **p** |
| MAP<60mmHg | 1.8 | [1.1-3.2] | 0.004 |
| Anaesthesia length | 1.3 | [1.1-1.5] | 0.0008 |
| Triple low state | 1.9 | [1.1-3.4] | 0.02 |

*[Multiple regression analysis]*

**Conclusion:** This study highlighted the impact of intraoperative variation on postoperative morbidity and mortality. Mortality seemed to be particularly influenced by greater aged patients and by the onset of postoperative organ failure in elderly patients undergoing GI oncological surgeries.

**Reference:**

1. Sessler, Anesthesiology 2012 ;116(6) :1195-203

## 15AP02-5

### Remifentanil protects human osteoblasts from oxidative injury

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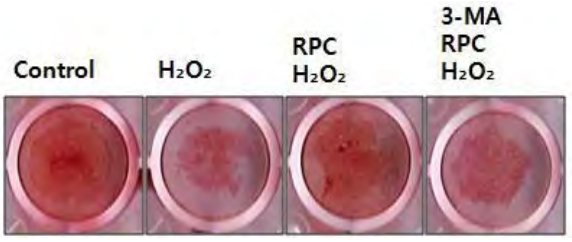
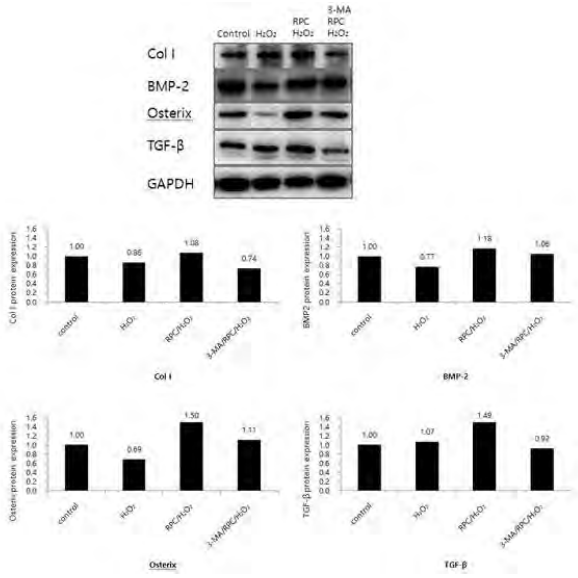
**Background and Goal of Study:** Bone injury has been occured in various clinical situations such trauma and surgeries. During surgery, excessive reactive oxygen species (ROS) decreases the quality and quantity of osteoblasts and increases the apoptosis of osteoblasts and osteocytes. It has been reported that remifentanil decrease the production of ROS and inflammatory response. In this study, we investigated whether remifentanil has a protective effect against oxidative stress in osteoblasts or not and influence on factors associated with proliferation and differentiation of osteoblasts.

**Materials and methods:** The groups were divided into the following groups; Control : cells were incubated at 37°C without remifentanil treatment, $H_2O_2$: cells were exposed to 200 $\mu$M of $H_2O_2$ for 2 h. RPC+$H_2O_2$ : cells were pretreated with 2 ng/ml of remifentanil for 2 h before exposure of $H_2O_2$. 3-MA+RPC+$H_2O_2$: cells were pretreated with 1 mM of 3-MA 1h and remifentanil before exposure of $H_2O_2$.

**Results and discussion:** Osteoblast viability and mineralized matrix of bone is increased by remifentanil pretreatment during $H_2O_2$-induced oxidative stress. Remifentanil pretreatment effectively decreased the rate of apoptotic nuclei in osteoblasts against $H_2O_2$-induced oxidative stress. In western blot analysis, remifentanil pretreatment increased the expression of bone-related proteins such as Col I, BMP-2, osterix, TGF-β. However, pretreatment with 3-MA inhibited the protective effect of remifentanil against oxidative stress at cell viability, apoptosis, and mineralized matrix formation.




*[Fig 1]*




*[Fig 2]*

**Conclusion(s):** This study demonstrated that remifentanil reduce oxidative damage in human osteoblasts. And we showed the possibility that autophagy is related with a protective effect of remifentanil in response to oxidative stress. For clinical correlation, further clinical based researches will be needed.

## 15AP02-6

### Influence of anesthesia on the metabolism of the brain and cognitive status of elderly and older in operations in gynecology

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**Background:** Emerging after surgery impaired memory, speech, praxis and gnosis are the actual problems of modern anesthesiology and surgery. Postoperative cognitive dysfunction (POCD), worsens the prognosis of the patient's recovery, degrades the quality of life, associates with increased mortality. The high frequency of occurrence, controversial issues of pathogenesis and prevention POCD cause keen interest in neuroscience and anesthesia. There is no clarity in POCD problem diagnosis, the correlation between the types of anesthesia and the incidence of irregularities. The emergence of the new brain metabolism studying methods, as well as the neuromonitoring funds development in perioperative period help to reveal the risks' factors and suggest methods of preventing POCD.

**Goal of Study:** The study of the effect of regional and general anesthesia with the use of halogenated anesthetics on the metabolism of the brain, cerebral blood flow and the development of postoperative cognitive impairment.

**Materials and methods:** The study involved 43 patients aged 66,7 ± 4.5 years. They were operated under our clinic about gynecological diseases. In 40% of cases had laparoscopic surgery. Laparotomy made up 14% of the vaginal surgery 44%.

In 27.9% of operations were performed under general anesthesia, neuraxial anesthesia is performed in 53.4% of cases, concomitant anesthesia - 18.7%

All patients were examined 1 day before surgery and for 5 days after surgery. The evaluation of the status of neurodevelopmental scales (MMSE, MoCA, Trail making test, Frontal assesment battery).

6 patients were investigated metabolites via brain H1-MRI.

**Results and discussion:** Patients diagnosed early POKD: Combined anesthesia: 14.5% General anesthesia: 15.2% Regional anesthesia: 16.8%.

Some reduction in brain metabolites during the second H1-MRI after anesthesia and surgery in patients with POCD.

**Conclusion(s):** Development POCD associated with a reduction in brain metabolites. The Trendelenburg position is not associated with the development of POCD. Cerebral blood flow in patients suffering under regional anesthesia, which can be a trigger of POCD.

Type of anesthesia has no effect on the incidence of POCD.

## 15AP02-7

### Audit into incidence of perioperative delirium in the elderly

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**Background and Goal of Study:** Surgical procedures in the elderly are increasing and bring unique challenges with it. It carries higher incidence of morbidity and mortality largely due to diminished physical and mental reserves as well as postoperative delirium (POD) which impacts rehabilitation and discharge from hospital. Consequentially the economic and clinical burden on the health service rises as currently 23% of surgical procedures are on patients over 75 years. We undertook an audit to see if tight control of perioperative BP had an impact on POD.
**Materials and methods:** All over 75 year old patients undergoing spinal surgery in our tertiary neurosurgical centre over 3 months were included. Data was gathered retrospectively including preoperative physical fitness, cognitive function, lifestyle habits and use of psychoactive drugs. Perioperative observations and medications were collected with endpoint being POD.
**Results and discussion:** 24 patients were identified and 21 included. Male preponderance was noted (M:F-14:7) with mean age of 78.9. Five patients were already on opiates while 3 were on psycho active drugs. 14 patients(67%) had polypharmacy but no history of cognitive impairment or alcohol abuse. ASA ranged from 2 to 4 with majority being ASA 2. Average BMI was 27(23-39) with inpatient stay of 6 days. Pre operative workup showed 38% had some disability for daily activities and renal impairment in 4 patients. 13 patients (62%) were diagnosed hypertensives.
All 21 patients underwent surgery of their spine and 2 were emergency. Perioperatively BP was monitored invasively in 5 patients and no benzodiazepines were used. 16 patients required Metaraminol for ionotropic support while 1 patient required Epihedrine and metaraminol. This was to maintain a MAP of 90 mm Hg. No cases of delirium were noted either in recovery or during inpatient stay.
**Conclusions:** Following the AAGBI publication of the perioperative care of the elderly (2014) our department introduced guidelines including avoidance of benzodiazepines in this age group and strict perioperative blood pressure control (within 20% of the original MAP). This audit demonstrates the importance of detailed preoperative workup and tight control of perioperative BP in minimising POD in the elderly.
**References:**
1. Peri-operative care of the elderly 2014. AAGBI safety Guidelines.
2. Peri-operative care of elderly patients - an urgent need for change. Dodds et al. Perioperative Medicine 2013

## 15AP02-8

### Adverse respiratory events (ARE) in elderly patients, can better be diagnosed with Integrated pulmonary Index (IPI), than pulse oxymeter and clinical observation at postoperative recovery room (PACU)

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**Background and Goal of Study:** In elderly, general anaesthesia can cause adverse respiratory problems (ARE). Early detection of ARE has important impact on hypoxia. PACU is the place where anaesthesiologists confront ARE. The value of integrated pulmonary index in high risk elderly patients after general anaesthesia is not well documented, so in this study focused to investigate the efficacy of integrated pulmonary index monitorization at PACU in high risk elderly population.
**Materials and methods:** After following ethics committee approval, in this prospective observational study, 140 patients aged over 65 were randomly allocated in two groups after general anaesthesia at PACU. All patients were reversed with sugammadex in order to exclude residual neuromuscular block. Group 1 was standard monitorized (ECG, pulse oxymeter, blood pressure) and with IPI analysis consisting of non-invasive ETCO2 + respiratory rate + heart rate+ pulse oxymeter. Number of ARE and number of interventions to avoid hypoxia were recorded. Group 2 was only standard monitorized. Student's t test and $x^2$ test were used to compare the groups, $p<0.05$ was accepted significant.
**Results and discussion:** Demographic data did not show any difference between groups. Mild hypoxia and apnoea were the most common AREs. IPI alerted all apnoea episodes. (78 events, IPI=1) and hypoxia (34 events, IPI<3). Apnoea was observed most frequently in Group 1. (48 % Group 1 vs 1.42 % Group; $p<0.05$). Apnoea was observed at 8-10-12. minutes, whereas, pulse oxymetry registered only the hypoxia episodes.
**Conclusion(s):** In elderly patients at PACU, especially in detecting apnoea, IPI is more valuable than clinical observation and pulse oxymeter in elderly.

## 15AP02-9

### Cognitive disorders associated with hip fracture surgery in the elderly. An observational study

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**Background:** Hip fracture is a common condition in the elderly, and most of them require surgical repair. 40% of these patients present cognitive disorder. Current literature reflects the need for an interdisciplinary approach in these patients to prevent cognitive impairment, provide fast recovery and reduce the risk of loss of autonomy in the long-term. Thus, the present study examines the rate of cognitive disorders associated with surgery for hip fracture.
**Materials and methods:** We conducted an observational descriptive pilot study in which patients aged 65 years or above with a hip fracture and scheduled for surgical repair of hip were recruited.
A Mini-Mental State Examination (MMSE) was performed the day before surgery. We avoided to perform the MMSE in the morning of the surgery to avoid bias (anxiolytic premedication).
Epidemiologic, analytical and pain data were also collected (age, sex, hematocrit, VAS) as well as anaesthetic/surgical and PACU data.
A second MMSE was done when patient was discharged from the PACU to the ward and a third one 24h after surgery. Changes in MMSE score were evaluated, being defined as mild (10%), moderate (20%) and severe (30%) when compared with the first test.
**Results:** 17 cases were recorded with an average age of 83 years old. 94% of the surgery where realised under regional anaesthesia.
Before surgery, 33% of those aged <80 presented mild cognitive disorders, 50% of those aged >80.
After surgery, 6% did not present changes in the mini-mental test, 47% presented mild changes, 29% moderate changes and 18% presented severe changes. No patient presented delirium.
We also found an association of impairment with transfusion needs, use of vasopressors and sedation.
**Discussion:** Although our pilot study lacks of a great number of patients, the primary results obtained show that cognitive deterioration is very important in older patients scheduled for hip repair surgery. This results may vary from other countries due to the fact the number of hip repairs realised under regional anaesthesia in Spain is about 90%. A greater multicentric study with other countries would be interesting in order to compare both techniques.
Nevertheless, associations with anesthetic management were found and require further research.
**Conclusion:** Hip repair in the elderly is associated with an important rate of cognitive impairment.
Larger studies are needed in order to confirm these results.

## 15AP02-10

### Cognitive impairment in the elderly surgical patient: unrecognised and underestimated?

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**Background and Goals:** Cognitive impairment (CI) in the elderly surgical patient is now increasingly recognised. Presentations may range from confusion through to delirium. Over 75% present as fatigue and reduced activity, frequently mistaken for sleepiness[1]. CI affects 10-50% of surgical in-patients, over half have persistent symptoms after discharge with consequent societal and Primary health care impact. Delirium is a risk factor for new onset dementia as well as for accelerating pre-existing problems. The predisposing factors- embolisation during surgery, hypotension, hypoxemia, inflammation/ stress response to surgery and potential neurotoxicity of anaesthetic agents- are common in the surgical scenario.
Our institution has mandatory recording of ‚6CIT test' for CI in the risk age group- however this is only done once. We set out to look at how well delirium was diagnosed on the wards.
**Materials and methods:** Data was collected from the patients group (criteria age>75 years, admitted on the surgical ward) for a two week period in Oct/ Nov 2015. A total of 33 patients were followed up. The 4AT test was used: this is a screening instrument that looks at Alertness, Abbreviated Mental Test (AMT4), Attention and Acute change. A score of 1-3= possible cognitive impairment, 4 or above= possible delirium.
**Results and discussion:** 14/33 patients scored 0 everyday, 1 patient with known dementia refused to answer any question. 6 patients scored 4 or above in 10 episodes, of which 4 were missed by our ward staff.
The remainder 12/33 scored 1-3. Several of these higher scores were later on in the inpatient episode (days 3-6). 1 patient scored 4 on two consecutive days.
**Conclusions:** The 4AT was relatively easy to administer and did not need specialised training. However communication difficulties (hearing, non English speakers) were not catered for.
A single point test will clearly underestimate the prevalence of CI on the ward. Missing CI can impose significant burden on patients, carers and on community resources. This short snapshot shows that nearly 36% of patients with CI are being missed. Interventions are needed to correctly pick up elderly patients with cognitive dysfunction, before being discharged and to have further community based assessment till continued improvement is noted.

## 15AP02-11

### Preoperative risk factors for postoperative delirium (POD) on elderly patients undergoing urological surgery

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**Background and Goal of Study:** The aim of this observational study was to investigate the occurrence of postoperative delirium (POD) in elderly patients undergoing urological surgery and to identify those factors associated with delirium.
**Materials and methods:** This study is a prospective. Participants of this study are 1496 patients older than 65 years old, Patients with MMSE <23 were excluded from the study.The comparing value that was used for delirium was CAM. Patients that had been diagnosed and treated for psychiatric problems were excluded from the study. Routine preoperative blood test was performed .Intra-operative data from the anesthesia record were also reviewed.
**Results and discussion:** It is noticed a lineal statistically important trend of increasing the incidence of delirium with the increasing of age.( $\chi 2$ for trend =14.3 p<0.01).POD occured in 270 patients(18%).The patients who was alcohol users had the highest incidence of POD. From 140 were alcohol users POD made 60 of them (57.1%) (RR = 8.1, 95% CI = 5.6-11.8, p <0:01). The patients that were preoperatively user to benzodjazepinave had a higher incidence of post-operative delirium. (29.7%)(RR=2.7, 95%CI=2.04-3.59 , p<0.01). From 1496 patients only 40 (2.6%) had epidural catheter ,was managed best post-operative pain .From these 40 patients, only 4 (10%) had delirium versus 36 (90%) that did not have delirium with statistical difference important among them (p <12:01)It noted that all patients who have contact with their families after the operation 306 (100%) did not have delirium, while the 150 patients who did not have contact with the family 50 (33.3%) had delirium with difference statistically significant between them (p <0,01).One or more comorbidity conditions were more frequent (62.5%) in the delirious patients than in the non-delirious patients (55%), but the difference was not statistically significant (n.s.) ($\chi^2$= 18.1 p<0.01).Delirium was more evident to male patients and spinal post-anesthesia.There was important statistical difference p<0.05, when comorbidity pre-opeatively is compared with changes on hemodinamic intra-operatively and with not afficient pain management.
**Conclusion(s):** Combining some of the predisposing factors as age vancuar, use of alcohol, benzodjazepinave, hemodynamic fluctuations, pain, increase the risk for delirium post operatively to elderly patients.

# Education

## 16AP01-1

### The effects of four years of a training programme aimed to teach anesthesiology and critical care to medical students

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**Background and Goal of Study:** During the last decade Romania confronted with a shortage of anesthesiologists and intensivists. In order to overcome this problem we developed a training programme aimed to teach both basic science courses and basic clinical and practical skills to undergraduate medical students. This programme was initiated in Romania in 2012 under the name « be a good doctor ». Our aim is to present the content of our programme and to evaluate its results.
**Materials and methods:** The programme was co-financed from the European Social Fund. Students underwent theoretical courses, 6 hours of clinical duty per day and two-days training on a simulator for three weeks. Their activity was coordinated by ten academic or senior physicians and was recorded in a log-book. Theoretical and technical knowledge goals included: to teach technical skills (e.g. venous access, airway management, resuscitation) and initial assessment and management of critically ill patients. A written test was given at the end of the training programme and the students that registered the top results were given the opportunity for a week of further improvement of their knowledge abroad (Paris, France). An anonymous questionnaire was given at the end of the test in order for the students to express their opinion on the programme.
**Results and discussion:** The number of applicants rose significantly from year to year. The number of medical students that underwent this programme was 30 in 2012, 150 in 2013, 150 in 2014 and 200 in 2015. Most students considered the programme to be a success and they thought that they improved both their clinical and practical skills. Approximately 50% of students think of applying for an anesthesiologist position after graduating from medical school. We also observed that this year anesthesia and critical care became one of the top specialties chosen by medical students after graduating their board exams.
**Conclusion(s):** This is the first structured programme initiated in Romania that allows medical students to understand the theoretical and technical skills of anesthesiology and critical care. We estimate that given the rising number of applicants, this programme is a success. We consider that the impact of our programme for solving the shortage of anesthesiologists in Romania is essential.

## 16AP01-2

### Identification of ethics committees based on authors' disclosures. A cross-sectional analysis of articles published in the European Journal of Anaesthesiology 2011

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**Background:** Publication in scientific journals requires that articles reporting on human experimentation report approval by a competent ethics committee (EC). Since 2010, the *European Journal of Anesthesiology* (EJA) even requires that five specific items related to the EC are mentioned in an article:
1) EC's name,
2) EC's address,
3) name of the chair of the EC,
4) protocol number, and
5) date of approval.
We set out to quantify the degree of adherence to these requirements in articles published in the EJA one year later and whether the information provided allowed contacting the relevant ECs.
**Methods:** All articles published in the EJA during the year 2011 and requiring ethics approval were identified. For each included article, we checked how many of the required items were reported. We then attempted to identify the relevant EC based on the reported information through a web search. For each identified EC, we tried to contact the committee, by Email or letter, to verify whether the EC had actually given approval for the respective study.
**Results:** We screened 193 articles of which 75 required ethics approval.
Two articles (2.7%) did not report on any ethics approval.
Of the remaining 73 articles, 33 (44%) reported on five items and 40 (53%) reported on ≤4 items.
We were able to identify 43 EC (59%): 24 of the 33 articles (72%) reporting on five items, and 19 of the 40 articles (48%) reporting on ≤4 items (p=0.023).
Of the 43 identified EC, 35 (81%) answered our inquiry; 25 confirmed that they were indeed the responsible body for the investigated study, and ten were unable to confirm this.
Of the 35 ECs that answered our inquiry, 17 (48.6%) were mentioned in articles reporting on five items, and 18 in articles reporting on ≤4 items (51.4%).
**Conclusions:** Reporting five specific items in the description of the ethics approval in published articles made the identification of the competent ECs easier, but did not improve the actual contact with the ECs. Effort should be made to identify the information required that allows successful identification and contact of ECs.

## 16AP01-3

### Publication bias in high impact anesthesiology journals - a retrospective analysis of 5 highest impact factor journals

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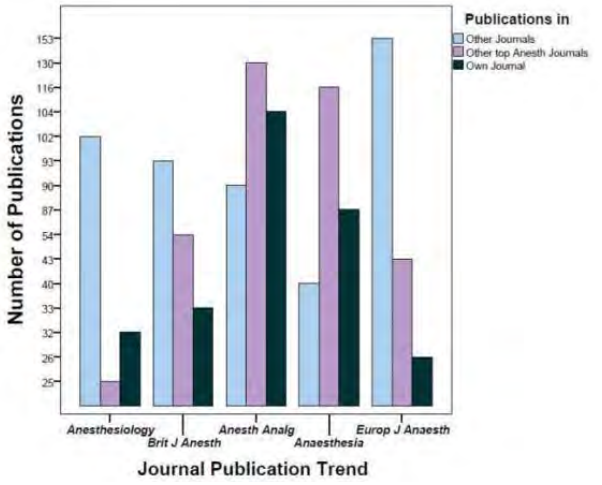
**Background and Goal of Study:** We hypothesized that, being on the editorial board of high impact anesthesiology journal, increases the chances of publishing in the same journal.
**Materials and methods:** We chose the top five journals in the field anesthesiology, as rated by Thomson Reuters Corporation generated impact factor. These included, Anesthesiology,British Journal of Anesthesia, Anesthesia & Analgesia, Anaesthesia and European Journal of Anesthesiology. We analyzed the sources of publications indexed on pubmed, appeared in the last five years and authored by the five consecutively listed editorial board members, as per the journal website
**Results and discussion:** The results and their P values are presented in the table and figure. Our analysis demonstrates an extremely high (P<0.001) non-homogenous distribution of publications authored by the editorial board members. The second P value further highlights the fact that the editorial board members of high impact factor anesthesiology journals chose to publish their work in their own journals vs other high/higher impact factor anesthesiology journals. We are in the process of studying the ratio of editorial board members publications to the total number of publications in these journals. Although, we do not see any ethical violations in the practice, the findings are bound to raise many questions.
**Conclusion(s):** Editorial board members of high impact factor anesthesiology journals are significantly more likely to publish their work in their own journal vs other high/higher impact factor journals.




*[Figure 1]*

Table 1 A

| Editorial Board Member | Number of publications in the journal where the author is the editorial board member | Total number of publications in the remaining 4 highest impact factor anaesthesiology journals | Total number of publications in all other journals indexed on pubmed | P value-1 | P value 2 |
|---|---|---|---|---|---|
| **Anesthesiology** | | | | | |
| *Member A* | 0 | 1 | 13 | 0.001 | NA |
| *Member B* | 5 | 12 | 15 | 0.085 | 0.332 |
| *Member C* | 7 | 4 | 10 | 0.276 | <0.001* |
| *Member D* | 13 | 7 | 49 | <0.001 | <0.001* |
| *Member E* | 7 | 1 | 15 | 0.002 | <0.001* |
| *Total* | 32 | 25 | 102 | <0.001 | <0.001* |
| **British Journal of Anesthesiology** | | | | | |
| *Member A* | 8 | 10 | 5 | 0.438 | 0.010* |
| *Member B* | 6 | 19 | 25 | 0.003 | 0.617 |
| *Member C* | 5 | 11 | 44 | <0.001 | 0.261 |
| *Member D* | 7 | 7 | 12 | 0.382 | 0.005* |
| *Member E* | 7 | 7 | 7 | 1.000 | 0.005* |
| *Total* | 33 | 54 | 93 | <0.001 | <0.001* |
| **Anesthesia & Analgesia** | | | | | |
| *Member A* | 26 | 30 | 4 | <0.001 | <0.001* |
| *Member B* | 70 | 81 | 35 | <0.001 | <0.001* |
| *Member C* | 4 | 14 | 40 | <0.001 | 0.014 |
| *Member D* | 1 | 2 | 0 | 0.564 | 0.964 |
| *Member F* | 3 | 3 | 11 | 0.023 | 0.086 |
| *Total* | 104 | 130 | 90 | 0.022 | <0.001* |

*[Table 1 A]*

| Editorial Board Member | Number of publications in the journal where the author is the editorial board member | Total number of publications in the remaining 4 highest impact factor anaesthesiology journals | Total number of publications in all other journals indexed on pubmed | P value-1 | P value 2 |
|---|---|---|---|---|---|
| **Anaesthesia** | | | | | |
| *Member A* | 7 | 7 | 1 | 0.081 | 0.005* |
| *Member B* | 12 | 13 | 6 | 0.140 | 0.001* |
| *Member C* | 15 | 17 | 5 | 0.035 | <0.001* |
| *Member D* | 18 | 25 | 19 | 0.206 | <0.001* |
| *Member E* | 35 | 52 | 13 | <0.001 | <0.001* |
| *Total* | 87 | 116 | 80 | <0.001 | <0.001* |
| **European Journal of Anesthesiology** | | | | | |
| *Member A* | 8 | 9 | 96 | <0.001 | 0.005* |
| *Member B* | 5 | 3 | 11 | 0.065 | 0.068 |
| *Member C* | 6 | 12 | 11 | 0.143 | 0.157 |
| *Member D* | 6 | 15 | 43 | <0.001 | 0.326 |
| *Member F* | 3 | 4 | 20 | <0.001 | 0.131 |
| *Total* | 26 | 43 | 183 | <0.001 | <0.001* |

Table 1 B

Table 1 A and B. Comparison and statistical analysis of the total number of pubmed indexed publications by randomly selected editorial board members over the last 5 years. All the members had disproportionately higher number of publications in the journal where they were on the editorial board, the probability of such an event happening by chance alone was less than 0.001, both when frequencies were compared with those in other 4 highest impact factor journals or other pubmed indexed journals combined.

*[Table 1 B]*

## 16AP01-4

### Estimated cost of anaesthesia. Do we know the economic impact involved in our daily clinical practice?

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**Background and Goal of Study:** It is essential an efficiently manage of limited health resources. In anaesthesiology we can better manage resources making rational use and assessing risk-benefit, but for this reason we need to know the cost of drugs and devices used. Our objective was to estimate the degree of knowledge of anaesthetics costs by nursing, anaesthesia and surgery staff and its possible influence on the choice of anaesthetic technique.
**Materials and methods:** Surveys were distributed to surgical nursing, anaesthesiologists and surgeons. Each survey consisted of four cases with four frequent interventions (total hip replacement, inguinal hernia repair, duodenopancreatectomy and breast reduction). Participants should choose the type of anaesthesia, reasons for choice and estimated cost (euros). The most common type of anaesthesia for each case and their estimated cost (drugs and consumables used) by specialty and years of experience (≥5 or <5) were analyzed. Data were compared with prices of our hospital purchasing department. It was calculated $Ch^2$ statistical analysis for qualitative variables, t of Students for quantitative variables and ANOVA, CI 95% and $p < 0.05$.
**Results and discussion:** 100 surveys were distributed to surgical nursing (18%), anesthesiologists (40%) and surgeons (42%). Subarachnoid anaesthesia and sedation was chosen for total hip replacement by 95% of respondents. The overall average estimated cost of €53.12 (IC 95% (143.20- 162.92)), 928% higher than the actual cost. 57% chose hernia repair with spinal anaesthesia and sedation, with an overall average estimated price of €127.72 (IC 95% (117.92-137.52)). In duodenopancreatectomy, 44% opted for balanced general anaesthesia with sevoflurane combined with epidural catheter, with an estimated average cost of €488.64 (IC 95% (439.64-537.64)), 117% more than the actual cost; except anaesthesia who infraestimated 68.67%. In breast reduction 37% chose TIVA, with an estimated average cost of €298.50 (IC 95% (269.11-327.91)), 685.75% overestimated.
There were no differences between specialties or experience. Though anaesthesia was closer to the price respect to other professionals ($p<0.001$) the difference was very important in practice and had no relevance.
**Conclusions:** Nursing and medical staff did not know the cost of anaesthesia, tending to overestimate the price of drugs and devices.

## 16AP01-5

### Learning behaviors of medical clerks during operating room rotations

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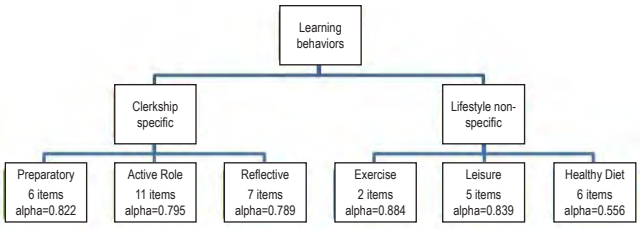
**Background and Goal of Study:** Positive learning behaviors are believed to be associated with improved student learning. Measuring these behaviors can be useful when circumstances do not permit researchers to use expert evaluation of learning outcomes. We therefore developed a survey tool to measure medical clerk learning behaviors during OR rotations. We then used this tool to generate a preliminary description of the learning behaviors of medical clerks.
**Materials and methods:** A cognitive model called "brain-based learning" guided question generation. This model is inclusive of any behavior that influences cognitive development, including general lifestyle behaviors. Pretesting included cognitive interviews with five medical clerks and consultation with nine operating room staff and two psychometricians. The questionnaire was distributed to senior medical students from primarily Canadian and US institutions. Exploratory factor analysis was used to refine the model. Basic descriptive statistics for each behavior type were calculated. A Friedman's test with a Wilcoxon follow-ups evaluated differences in the frequencies of the learning behaviors.
**Results and discussion:** A total of 600 medical students completed the survey. The final model had two domains with three positive learning behavior types in each.




*[Learning behaviors model]*

Reliability was good. Active engagement occurred more frequently than the other clerkship specific learning behaviors. Exercise behaviors were significantly less common than other lifestyle non-specific behavior types ($p<0.01$). Only 18% of medical clerks engaged in frequent aerobic and resistance training as recommended by health guidelines.


*[Learning behavior frequencies by factor type]*

**Conclusions:** We have created a tool to measure the learning behaviors of medical clerks during operating room rotations. The tool can be used to describe medical clerk learning and may help inform educational interventions.

## 16AP01-6

### Evaluation of the impact of introduction research criteria in the internship of anaesthesiology in Portugal

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**Background and Goal of Study:** It is recognized that academic production leads to creation of knowledge and evolution of a specialty. In Anaesthesiology this is often undervalued.
Thus, in 2006 the Portuguese College of Anaesthesiology introduced a gridiron in the internship, with an item that values publication. The aim of this article is to evaluate the impact of this measure in publication production of this speciality.
**Materials and methods:** We intended to compare Anaesthesiology Portuguese publication with another specialty without a gridiron that values publication in internship program. In order to choose 1 specialty for comparison and to avoid a bias on residents' academic quality, the admission exam grades were studied from 2007 to 2014. It was concluded that Paediatrics had the closest mean. A search on Pubmed was run to obtain the number of articles published by Anaesthesiologists and Paediatrics between 2006-2014, and then between 1997-2005. Articles must have been published by Portuguese health institutions' departments and one author must be a Portuguese Anaesthesiologist/Paediatrician. Geometric mean was used to describe the annual growth rate of publication and stratified by period and specialty.
**Results and discussion:** For anaesthesiology, between 1997-2005, 21 articles were published, with a growth rate of publication of 14,7% per year. In the same period, for Paediatrics 164 articles were available, but the growth rate per year was 0%. Between 2006-2014, 100 articles were found for

Anaesthesiology and 499 articles for Paediatrics. The growth rate per year for this period was 27,1% for Anaesthesiology, with an increment of 12,4% in comparison with the previous analysis, and a growth rate and total increment of 18,4% for Paediatrics. Therefore Paediatrics leads research, which can be attributed to a more abundant financial support. Although research criteria could have boosted academic production, other problems should be regarded such as the funding reduction in Anaesthesiology and the growing need of the anaesthesiologists for assistance activity.
**Conclusion(s):** Academic research must be encouraged by Anaesthesiology departments, with support given to specialists so they can guide and enhance publication production of the respective residents.

## 16AP01-7

### Comparison of satisfaction with postgraduate training in anaesthesiology in European countries and Ukraine: survey of more than 200 clinicians

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**Background and Goal of Study:** One of the main features of the Ukrainian systems of postgraduate training in anaesthesiology is its extremely short duration - 2 years compared to 4-6 years in the Europe. The aim of our study is to identify and compare a level of satisfaction in postgraduate training and the readiness for independent working after residency among anaesthesiologists in Ukraine and in Europe.
**Materials and methods:** During European Congress “Euroanaesthesia-2015” Ukrainian delegation participated in an educational project “National Village” and represented the system of postgraduate education in Ukraine. Additionally, at the Ukrainian stand we offered delegates a short survey, which consisted of 5 questions about their postgraduate training (estimation was from 1 to 10 points in each). The same survey was conducted in Ukraine.
**Results and discussion:** Among 156 anaesthesiologists who were surveyed on ESA congress, 105 were from Europe and 51 - guests from other continents. The control group consisted of 105 Ukrainian clinicians. Term of work in a specialty anaesthesiology including residency training was about 17,7 ± 11,2 years for European respondents and 15,0 ± 8,7 years for Ukrainian. Term of their residency was indicated as an average 4,5 years by European doctors and 1,9 years by Ukrainian. European anaesthesiologists have evaluated their satisfaction from postgraduate training as 7,8 ± 1,8 points on a 10-points scale, similar as Ukrainian ones - 7,5 ± 2,0. The readiness to independent working along right after finishing residency was evaluated by European doctors as 8,1 ± 1,7 points, whereas the readiness of Ukrainian respondents was lower - 7,1 ± 2,1 ($p < 0,001$, t-test). 25% among European and 18% of Ukrainian doctors preferred to have the separate residency in anaesthesiology and in intensive therapy.
The same level of satisfaction with postgraduate training in European countries and in Ukraine was a surprise for us, considering the difference of the duration of residency. It could be explained by some overestimation of the residency training satisfaction by Ukrainian doctors. By the way significantly higher level of readiness to independent working after residency of European doctors justify longer duration of postgraduate training.
**Conclusion:** European anaesthesiologists have a longer duration of residency and their readiness to independent working after training is higher, but the satisfaction of postgraduate training are similar.

## 16AP01-8

### Crazy? Not really! A brainstorming on ideas to change anesthesia practice on the next ten years

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**Background and Goal of Study:** Thinking unconventionally in a setting were nothing is discarded as useless may be a very creative way of looking to problems and defininig opportunities of improvement not adressed normally. The educational goal for residents is training to develop a new idea from the outset in a cooperative effort as opposed to a personal thinking.
**Materials and methods:** We challenged our group of 30 residentes to a brainstorming on unconventional approaches to actual or possible problems on the anesthetic practice on coming years. A discussion of each idea received the inputs of others, eventully leading to a proposal that was either technologic feasible or could be developed.
**Results and discussion:** Ten ideas were select for proposal, presented as “What if?”:
1. The anestesia machine was an fully integrated workspace as opposed to an workstation?
2. You could print a unique face mask for a unique patient with abnormal anatomy?
3. You could prepare your anesthesia from a “vending machine”, just by selecting from a list with no error on drug preparation and labelling?
4. You could “ionize” a body segment or area, causing temporary local anaesthesia for simple maneuvers? No sistemic effects, portable anestesia.
5. A universal convention of color-labeled drugs to prevent administration error?
6. Have all anestesia monitoring integrated on the surgical table with wi-fi connection to the patient?
7. Use a robotic exoskeleton for post operative early mobilisation or ICU rehabilitation, with integrated monitoring and oxigenation support?
8. An editable anesthesia ID card, by RFcodes integrated on the pulse ID of the patient?
9. Wearable monitoring, for really perioperative monitoring and early detetion and prevention of major cardiac events.
10. We could have video assisted laringoscopy (Google glass style) with on-line counselling.
**Conclusion(s):** Stimulating unrestriced free thinking in a controled setting may make us aware of simple solutions to old problems, and anticipate how to put at work tecnhology we already have to improve patient safety and clinical results.
**Acknowledgements:** Other than the authors of the abstract. We aknowledge the contributions of Drs. Leina Spencer, Paulo Nave and Gonçalo Almeida, all residents of our department. Also Dr Marco Monteiro was the first to mention the exoskeleton idea. Dr Margarida Ferreira worked also on the poster layout.

## 16AP02-1

### Establishing the catalogue of basic procedural skills (BPS) practiced in anaesthesiology-intensive care departments - a regional French survey

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**Background and Goal of Study:** In anaesthesiology departments, organizing for each patient a secure management will rely upon good observance of different BPS. The goal of this study is to present a detailed catalogue of the BPS practiced by team of anaesthesiologists working in university departments.
**Materials and methods:** A seminal list of 120 BPS was addressed for upgrading to different anaesthesiology units (n= 14) associated in a common regional training program.
**Results and discussion:** The structured catalogue issued from all iterative processes contains finally 304 BPS reported by the anaesthesiologist’s population consulted. The BPS collected for each of the 19 sections proposed are mentioned into brackets.

CATALOGUE CONTENT
1-Non invasive Equipment (22)
2-Semi-invasive Equipment (11)
3-Invasive Equipment (23)
4-Injections and infusions (6)
5-Techniques associating local anesthetic drugs (63)
6-Patient's interfaces for ventilator techniques (38)
7-Oxygenotherapy (10)
8-Infections and contaminations prevention (13)
9-Peri-operative risks reduction (13)
10-Techniques for continuous analgesia (9)
11-Body damage prevention (13)
12-Hemorrhagic risks prevention and use of blood derived products (18)
13-Mastering monitoring Equipment (21)
14-Mastering non monitoring Equipment (19)
15-Equipment and actors adaptation to particular environments (9)
16-Techniques for managing RCP (5)
17-Punctures and drainings (9)
18-Extra-corporal filtration (1)
19-Peri-operative hypnosis (1)
All BPS listed are not specific to our specialty but the final number obtained seems quite higher than those collected among parent specialties as intensive care or emergency units (unpublished data). These results point out that our specialty has an original mix of medium to high level of technicity, high level of transversality concerning patients recruitment, mastering of many specific BPS ( see sections 5 and 6), and elevated safety culture imposing many risk-preventive BPS. The number of BPS presently reported is far in excess than any spontaneous estimation evoked by colleagues not involved in this study.
**Conclusion(s):** The appropriation of this BPS catalogue by our specialists can be a major contributive factor to orient the training programs to a new team work, leading for all care providers evolving in our departments, to a fair BPS qualification process. A BPS qualification orientation appears critical and sound to reinforce the safety culture of our specialty.

## 16AP02-2
### Fibre optic intubation training with the help of smartphone application

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**Background and Goal of Study:** The younger generation of the anesthesiologist is familiar with both video games and benefits of interactive technology. They could develop their skills by the help of the virtual reality software application (app) iLarynx which mimics hand movements for the performance of fibre optic intubation (FOI). The goal of our study is to investigate whether the FOI learning process is more efficient when the app is being used.
**Materials and methods:** Randomised, controlled, single-blinded trial was held in the Lithuanian University of Health Sciences. Medical students (n=54) have been taught about the FOI in the theoretical lecture, after which they were randomly divided into two groups: G1 - iLarynx training (n=28), G2 - no additional training (n=26). G1 was instructed to use the iLarynx app for the whole month until they will be satisfied with their FOI performance. After the month, students' skills were being tested with the help of the FOI moulages. The duration of the task fulfillment was assessed. Researchers who observed FOI were unaware of students' group allocation. Results are presented as mean ± standard deviation or median. Differences between independent samples were measured by nonparametric tests at $p<0.05$.
**Results and discussion:** There was no significant difference in the duration of intubation between the groups (G1 56.46±17.825 s, G2 58.04±29.26 s, U=336,5, p=0.634). 27 students (50.0%, n=54) who had previous experience with endotracheal intubation were equally divided between the groups (G1 - 13 stud., G2 - 14 stud., $\chi^2=0.586$, p=0.768). G1 used the iLarynx app from 1 to 10 times a week, the median is 3 times a week. Weekly duration of training was 4 - 60 min, average 17.43±16.43 min.
G1 students used the app significantly more often if they have had previous endotracheal intubation experience. (U=54.5, p=0,04). Results might be so due to modest sample and learning period. Further work is necessary.
**Conclusion(s):** The data shows no significant change in the fibre optic intubation learning efficiency. The motivation to practice is bigger when a student already has experience in the particular field.
**Reference:**
De Oliveira GS Jr et all. Virtual airway simulation to improve dexterity among novices performing fibreoptic intubation. Anaesthesia. 2013 Oct;68(10):1053-8.

## 16AP02-3
### Anatomical trainer for bronchoscopy

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**Background and Goal of Study:** Commercial trainers for bronchoscopy are useful for acquiring psychomotor skills, dexterity and eye-hand coordination, but the cost is a limiting factor of accessibility there. Our aim was to make a real-size anatomical model of tracheobronchial tree and investigate it's suitability for FOB training.
**Materials and methods:** A model of tracheobronchial tree was made based on anatomy textbooks and article by S. Di Domenico from wire, paper, glue and paint using papier-mâché technique. Photos of the trachea, carina and right bronchus were made during the FOB and put next to a real human bronchoscopy photos. 54 medical students (S) performed FOB on our model and on commercial trainer after the lecture. 8 certified anaesthesiologists - experts (E) and the same students took the semi-structured interview about our made model. Differences between FOB duration on both trainers were measured by the Wilcoxon signed ranks test at $p<0.05$.
**Results and discussion:** Almost all answers (E 24, 100%, S 49, 91%) concerning the similarity between the model and real human anatomy (in photos) were "completely similar" and "similar". E (8, 100%) and S (54, 100%) agreed that anatomical models are necessary for training and would be worth the time spent while making them.
1 (12.5%) E preferred models to be manufactured and stated that making models are beneficial only for students who make them.
3 (37.5%) E, 31 (58.5%) S thought that it would be good for practising and gaining motor skills because of unlimited practice time.
1 (12.5%) E and 13 (24.5%) S emphasized low economical expenses.
On the other hand, 1 (12.5%) E and 14 (26.4%) S stated that such model might be short-lived. Others were concerned that colour and texture, lack of cartilage rings might reduce resemblance to real anatomy (E 2, 24.5%, S 19, 35.8%).
The duration of FOB on students' model was 7 - 384 s, mean 51.5±62.98 s, median 27.0 s mode 18.0 s. 4 (7.4%) S did not complete the task. The duration of FOB on commercial model was 7 - 176 s, mean 50.1±30.01 s, median 44.0 s mode 33.0 s. 1 (1.9%) S did not complete the task.
There was no significant difference in the duration of FOB between the models (p=0.322).
**Conclusions:** Our model was anatomically correct and made from cheap materials. The duration of FOB was not significantly different between our model and commercial one.
**Reference:**
Domenico SD et all. Inexpensive anatomical trainer for bronchoscopy. ICVTS. 2007 Jun; 567-569.

## 16AP02-4
### The CASS simulator: first results with a new ultra-portable iPad™ based flexible bronchoscopy simulator

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**Background and Goal of the Study:** Fiberscopy is widely used by anaesthetists. Virtual reality simulation is an effective and safe method to teach bronchoscopic skills. Few high-fidelity bronchoscopy simulators exist; they are large, cumbersome and expensive. We developed an ultra-portable high reality iPad™-based bronchoscopy simulator and report of its first use by anaesthesiologists.
**Materials and methods:** The CASS simulator (Computer Airway Simulation System) consists of a proxy bronchoscope and a basic robotic device, wirelessly connected to an iPad™. The robotic interface tracks proxy motions and provides haptic feedback while the iPad displays a specifically developed three-dimensional high quality graphic model of human airways. An optional roadmap indicates the position of the bronchoscope. The system automatically records the duration of the procedure, number and sequence of bronchial segments inspected, and number of collisions with tracheobronchial wall. Anaesthetists attending a Swiss difficult airway course were recruited to assess the CASS. Objective performances were assessed with participants

performing a bronchoscopy from mouth to the right superior lobar bronchus (RSLB). We used an assessment tool of bronchoscopic performance[1], combining number of wall collisions, ease of pass through vocal cords, image centering and "red-out time" (0 = bad to 8 = very good). Subjective criteria (bronchoscope proxy handling, graphic quality of the model, anatomy fidelity, reactivity of the system and usefulness for teaching) were assessed using a Likert scale (1 = bad to 5 = very good).

**Results and discussion:** 22 physicians were enrolled. Seventeen (77.3%) had > 10 years of clinical experience and 13 (59.1%) had performed > 50 bronchoscopies. Mean time to reach the RSLB was 92 ± 35 sec, mean number of wall collisions during procedure were 12 ± 15. Bronchoscopic performance was 4.7 ± 2.5. Scores of subjective assessment were as follow: bronchoscope proxy handling 4.0 ± 0.7; graphic quality 4.7 ± 0.5; anatomy fidelity 4.5 ± 0.6; reactivity of system 3.6 ± 1.1, usefulness for teaching 4.9 ± 0.3 and ease of use 4.3 ± 0.8.

**Conclusions:** Subjective assessment by participants of the simulator was excellent, especially as a tool for teaching and with regards to the graphic quality. Reactivity of the system should be improved in future. Bronchoscopic performance of participants was acceptable.

**Reference:**

1. Graeser K et al. Eur J Anaesthesiol. 2014 Mar;31(3):125-30.

## 16AP02-5

### Evaluation of a low cost high fidelity arterial simulation device for ultrasound guided vascular puncture and cannulation

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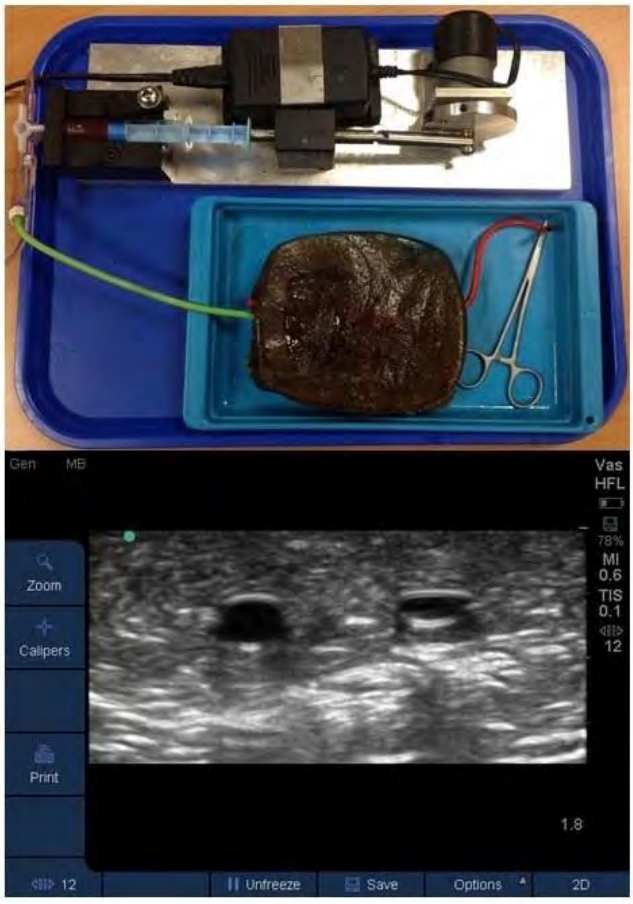
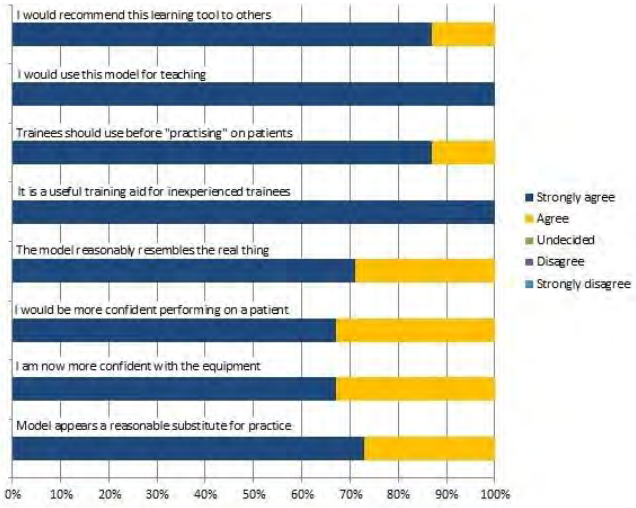
**Background and Goal of Study:** Obtaining ultrasound guided arterial access is a desirable skill for the modern day anaesthetist. Vascular access phantoms incorporating mechanical pump devices simulating pulsation for arterial puncture and cannulation are available, but costly. We endeavoured to create a low cost, effective, high fidelity simulation device for teaching this skill. We developed a fully functional, high fidelity arterial system compatible with various procedures.

**Materials and methods:** An existing variable volume/pressure arterial simulation pump[1] was connected to an elastic artery analogue (160Q size modelling balloon). This was connected to a pigmented fluid source at diastolic pressure. The pulsations at 60 per minute, and systolic pressure were provided by manipulating pump settings suiting the compliance of the vessel model. Any fluid aspirated from the system was automatically replaced at diastolic pressure. The arterial analogue was placed between two layers of ADAM gel (Aqueous Dietary fibre Antifreeze Mix gel) an ultrasound medium resistant to needle tract damage (Fig 1). The total cost was <£40, of which £30 was for the pump. It was then evaluated as a training tool using an established assessment questionnaire.




*[Figure 1. Top: Motorised arterial simulation pump connected to artery analogue in ADAM gel. Bottom: Static ultrasound image taken at the end of the study to show artery with pump driven pulsation (left) and adjacent compressible vein (right) to enable arterial cannulation]*

**Results and discussion:** The evaluation from 15 Anaesthetists at various stages of training is summarised below (Fig 2).




*[Figure 2. Bar chart to show results of evaluation of the high fidelity arterial simulation device as a training tool]*

**Conclusion(s):** It is possible to construct a high fidelity arterial access simulation phantom device at a reasonable cost that functions as an effective training tool.

**Reference:**

1. Improving the fidelity of vascular access and regional block phantoms by integrating arterial pulsations through the use of a novel motorised syringe pump. R. Jeevananthan, J. Willers, D.R. Uncles, L. Goosen, B. Bukunola, L. Bisht Presented at AAGBI WSM 2015

## 16AP02-6

### Face and construct validity of TU-Delft Epidural Simulator and the value of real time visualization

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**Background and Goal of Study:** Teaching epidural anesthesia is traditionally done at the bedside. It will increase patient safety and save valuable time if learning of motor skills could be done on a simulator and enhanced by visualization aids. Therefore, the face and construct validity of the TU-Delft Epidural Simulator were evaluated. Furthermore, the advantage of visualization of the needle advancement was evaluated.
**Materials and methods:** 68 anesthesiologist, anesthesia residents and final year medical students tested the epidural simulator in a standardized fashion. Participants performed 12 epidural needle placements, six with and six without visualization of needle advancement. Afterwards they gave feedback on a Likert scale questionnaire (face validity). The data collected with the simulator software (spinal taps, dura contacts, bone contacts, attempts and time) was correlated with the experience (construct validity). Finally, a visualization aid was tested in a randomized cross-over design.
**Results and discussion:** The simulator was assessed a mean of 3.7(2.0-4.8) on a 5-point scale. In the inexperienced group there were more spinal taps (0.4 (0-4) vs. 0.7(0-2), $p<0.05$) and more dura contacts (1.5(0-6) vs. 0.37(0-3),$p<0.01$) than in the expert group. Performance was improved by turning on the visual aid: it reduced the number bone contacts, the number of attempts and decreased procedure time. Having trained with visualization before reduced the total procedure time from 279(69-574) to 180(53-605); $p<0.01$.
**Conclusion(s):** The TU-Delft Epidural Simulator is a useful tool for teaching motor skills during epidural needle placement. Use of visual aid in advance improves performance even when the visual aid is not display during later punctures.

## 16AP02-7

### Procedure characterisation of ultrasound-guided femoral nerve block - a metrics-based approach

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**Background and Goal of Study:** Procedural skills comprise complex cognitive elements and observable behaviours. Detailed task analysis can be used to develop effective training and assessment tools. To date, the description of cognitive and physical processes which underpin learning and performance of ultrasound-guided femoral nerve block (USGFNB) is lacking. The objectives of this study are: (1) to describe the specific tasks and errors associated with USGFNB; (2) to define objective performance metrics for USGFNB.
**Materials and methods:** With ethics committee approval and having obtained written informed consent, a panel of three experts in ultrasound-guided regional anaesthesia participated in semi-structured interviews and facilitated group discussions to:
1. objectively describe USGFNB; and
2. to identify and define observable objective proficiency performance metrics.
The USGFNB procedural start and completion points were defined as from patient entering the block room to completion of block assessment.
Video recordings of expert and novice block performance were obtained from both first person (head mounted camera) and third person (mobile videography) perspectives. Synchronous ultrasound imaging was recorded live and superimposed onto the final video edit. These video files were reviewed by the expert panel to ‚stress test' the procedural description, errors and performance metrics.
**Results and discussion:** A comprehensive description of tasks and subtasks, procedural errors and performance metrics was compiled. Stress testing yielded operational definitions of 74 observable performance metrics and 26 errors.
**Conclusion(s):** This process has yielded a description of procedural tasks, errors and performance metrics relevant to USGFNB. Further validation is ongoing.

**References:**
Characterizing Novice Behavior Associated With Learning Ultrasound-Guided Peripheral Regional Anesthesia; B. Sites, B. Spence, J. Gallagher, C. W. Wiley, M. L. Bertrand, G. T. Blike; Reg Anesth Pain Med 2007; 32:107-115
Metric-based simulation training to proficiency in medical eductation: - What it is and how to do it; A. G. Gallagher, Ulster Med J 2012:81(3):107-113

## 16AP02-8

### Evaluation of peripheral venous way installation ultrasound-guided by young residents

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**Introduction:** On the peripheral vein infusion pose is one of the acts most frequently performed care. The superiority of ultrasound-guided peripheral perfusion on traditional manual tracking techniques is well demonstrated for the first peripheral venous difficult. The aim of our study was to compare two techniques for setting up peripheral vein in two transverse and longitudinal techniques, in terms of feasibility and complications.
**Materials and methods:** 60 patients were included in our study from July to September 2015, divided into two equal groups.
The identification of veins is performed using an ultrasound probe at high frequency flat head (7.5 Mhz) kind SonoSite vascular mode with use of doppler. las residents who have received theoretical and practical training, will trying to spot a peripheral vein in the upper limb and introduce a 18 gauge catheter. The procedure was performed in two different sections: transverse and longitudinal in the draw. We collected anthropometric characteristics of the patients, ultrasound locating times and the procedure, the number of attempts and the difficulty score evaluated 0-10.
**Results:** No difference between the two groups regarding the anthropometric criteria (weight = 74.4 ± 16.8 kg; height = 168.9 ± 18,6cm and BMI = 23.9 ± 2.7 kg / $m^2$).
Longitudinal section Cross section p
Brachial vein 17/30 19/30 0.23
Vena basilica 10/30 09/30 0.57
Cephalic vein 3/30 2/30 0.66
First anticipated difficult 4/30 6/30 0.39
Identification of medium duration (min) 3.7 2.9 0.077
Average procedure time (min) 4.8 3.6 0.056
Attempt average 41/30 39/30 0.44
Sucked from 0.22 22/30 19/30 first attempt
Failure incidence 3/30 2/30 0.17
Difficulty Score 4.7 / 10 3.8 / 10 0.042
Patient satisfaction 8.3 / 10 8.5 / 10 0.47
**Conclusion:** Ultrasound can facilitate cannulation of peripheral veins that is either longitudinal or transverse cutting without any difference between the two techniques. It improves patient comfort us and makes life easier by reducing the time of peripheral venous access, reducing the number of attempts, and limiting the use of VVC.

## 16AP02-9

### Basic procedural skills (BPS) documentation in training programs in anesthesiology and parent medical specialties: preliminary results

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**Background and Goal of Study:** In training hospitals, each medical specialty is concerned by a training program conception, propagation and control. Each specialty training program will, by definition, include various basic care procedures. The goal of this preliminary study was to record the quantitative differences observed in a hospital-scaled tool for declaring BPS in training programs. The hypothesis associated to this study was that some intra-specialties (considered at a regional scale) and inter-specialties differences may exist among the declared BPS portfolios.
**Materials and methods:** Access to the LOGIC™ (Reallience SA,Geneva) relational data base was given to the various medical units observed in a first-

stage regional propagation approach. Any BPS collected in a training program portfolio was identified among the various files created by each medical unit. Data were issued from 8 regional medical units including emergency, intensive care and anesthesiology departments. The anonymity of the 8 medical units studied was preserved according to strict contractual reasons.
**Results and discussion:** Among the different specialties studied,the BPS collected varied from 7 to 63 - see details below. The number of BPS is mentioned as (N).
Unit 1 - EMERGENCY (38)
Unit 2 - INTENSIVE CARE (56)
Unit 3 - EMERGENCY (7)
Unit 4 - INTENSIVE CARE (26)
Unit 5 - INTENSIVE CARE (31)
Unit 6 - ANESTHESIOLOGY (63)
Unit 7 - EMERGENCY (31)
Unit 8 - EMERGENCY (14)
The results recorded confirmed that intra-specialties heterogeneity was present -for emergency units, the number of BPS declared varies from 7 to 38; for intensive cares, BPS ranged from 26 to 56. Less unanticipated, the inter-specialties differences were quite obvious as the number of BPS declared varied between 7 (Unit 3-Emergency) to 63 (Unit 6-Anesthesiology). Of course, the intra-specialties heterogeneity observed actually is the consequence that the present BPS declarations remain entirely free.
**Conclusion:** These preliminary results are of the keenest interest: *first*, the civil society, including the patients, will have some difficulties to consider BPS heterogeneity in same medical training programs as a sign of high quality for the health system and *second*, at a hospital level, the resources and the budget needed for the conception, the propagation and the control of a given training program will be correlated with the number of BPS practiced.

## 16AP03-2

### 'Anesthesie a moindre risque' - our experiences introducing the safer anaesthesia from education (SAFE) obstetric course into French-speaking Africa

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The Safer Anaesthesia From Education (SAFE) Obstetric anaesthesia course is aimed at non-physician anaesthetists in low-resource settings[1]. It was designed to provide the specialist technical training needed to improve quality and safety of obstetric anaesthesia via skill and knowledge sharing between healthcare professionals from different countries. The course was devised on behalf of the AAGBI by Dr Kate Grady, and has been successfully delivered in many countries.
**Method:** The most recent courses in Congo-Brazzaville and Madagascar have required translation into French. This was achieved using local and international interpreters. SAFE is taught over three days as a combination of short lectures, small group interactive sessions and workshops. There is emphasis on the leading causes of maternal death in resource-poor settings, and the principles of the WHO Safe Surgery[2]. Candidates' knowledge is assessed at the beginning and end of the course via MCQ's (%) and hands on clinical skills tests (OSCE proforma marked out of 10). Candidate feedback is sought via standardized feedback forms.
**Results:** SAFE was delivered to 3 physician anesthetists and 25 anaesthetic practitioners in Congo-Brazzaville, and 24 physician anaesthetists and 15 anaesthetic practitioners in Madagascar.
An improvement in knowledge was demonstrated via pre- and post-course MCQ results in Congo-Brazzaville 66% vs. 68% (p=0.4), and Madagascar 69% vs. 77% (p=<0.05). A statistically significant improvement in performance clinical skills testing was also demonstrated in Congo-Brazzaville 4 vs. 6 (p=<0.05), and Madagascar 4.7 vs. 8 (p=<0.05).
Improvements in pre and post test scores reflected knowledge acquisition and retention by the candidates.
Feedback from candidates was overwhelmingly positive:
'In summary I can say that in 3 days, I grew a year.'
'Awesome, affirming and very practical.'
'The course was very interesting, very practical and very enriching.'
**Discussion:** The excellent candidate feedback and improvement in the post course MCQ and assessed clinical skills tests demonstrate that the SAFE course can be successfully delivered in the French language, and continues to be a much valued education resource.
**Acknowledgements:** We would like to thank the AAGBI, Mercy Ships, our fellow faculty, and all the candidates.
**References:**
1. Dr Kate Grady, AAGBI Accessed 16/1/15
http://www.aagbi.org/international/international-relations-committee/refresher-courses
2. WHO Guidelines for Safe Surgery 2009

## 16AP03-3

### Critical Airways: an educational initiative for professionals managing critically ill patients' airways

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**Background and Goal of Study:** Airway interventions in Critically ill patients are high risk procedures with the potential to cause permanent harm or death, as evidenced by the national audit undertaken by the Royal College of Anaesthetists and Difficult Airway Society[1].
The main objective of the "Critical Airways" programme is to improve the practical airway skills of students, with an emphasis on improving safety in the event of airway emergencies.
**Materials and methods:** The one day course was divided into morning and afternoon sessions. The morning session consisted of a number of tutorials on the following key topics:
- **Complications of Airway Management**
- **Non Technical Skills**
- **Risk Management**
- **Effects of Anaesthesia**
- **Difficult Airways**

The afternoon session consisted of five practical stations arranged in a circuit. The stations were designed to address five main airway skill sets in Critical Care:
- **Basic Airway Management**
- **Intubation**
- **Difficult Airways**
- **Extubation**
- **Tracheostomy Management**

**Results and discussion:** The course was run twice in May and September 2015. In total 26 Candidates completed the course of whom 10 were doctors and 16 were nurses. A summary of the candidates' feedback is given in figure 1 below:

| Question | Mean Score (scale from 1 - 9) |
|---|---|
| The objectives of the course were met | 8.64 |
| My knowledge of airway management has improved | 8.71 |
| My practical skills have improved | 8.21 |
| My management of airway problems is safer | 8.35 |
| I received helpful feedback | 8.28 |
| The trainers were supportive | 8.92 |
| I would recommend this training to my colleagues | 8.86 |

*[Figure 1. Candidate Feedback]*

**Conclusion(s):** Within our institution the training needs of non-anaesthetists had not previously been addressed prior to the development of the "Critical Airways" course. The course may be of value to practitioners in other institutions, and we have already attracted interest from external candidates. Although there may be shifts in attitude for individual participants after undergoing training, it should be recognised that patient safety is dependent on a range of broader institutional factors[2].
**References:**
1. Cook, T.M. Woodall N. et al (2011) Major complications of airway management in the UK: results of the 4th National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. *British Journal of Anaesthesia* 106 (5) 632-642
2. Vincent C (2003) Understanding and responding to adverse events. *New England Journal of Medicine* 348 (11) 1051-6

## 16AP03-4

### It's time for a change of view in thyroid surgery?

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**Background:** True postoperative vocal cord (VC) paralysis (VCP) secondary to the injury of the recurrent laryngeal nerve (RLN) is one of the major thyroid surgery complications, but with a low incidence, around 3%, rising to 13% in reoperation.
Identifying the RLN visually during surgery can lower the incidence of RLN injury and the permanent injury rate of 0.9%.
IntraOperative Nerve Monitoring (IONM), electromyographic recording of the thyroarytenoid muscle activity after electrical stimulation of the vagus or RLN nerves, increases the safety for the patient reducing permanent injuries of RLN during thyroidectomy.
**Materials and methods:** We performed a search of the current literature about the use of IONM in thyroid surgery.
**Discussion:** IONM can be done with an electromyographic endotracheal tube (EMGTET) which has a band with electrodes surface that should be placed at the level of the VC (1).
It's recommended direct visualization during placement of the EMGTET and a subsequent check (2), once placed the patient prior to surgery, and has been published the check of the placement when removes the Fiberoptic bonchoscopy (3), looking through the tube or with a direct laryngoscopy. But, since the repeated laryngoscopy can lead to the trauma and subsequent complication of ventilation, should be limited number of attempts.
Videolaryngoscopes (VL) allows accurate checking of the placement of the band between the VC with less trauma and complications.
**Conclusion(s):** VL offers an improved view compared with traditional direct laryngoscopy. The method of laryngoscopy has a direct effect on the appropriateness of the choice of device for successful tracheal intubation. So that, in thyroid surgery, VL should be performed as routine intubation device. And Ear-Nose-Throat (ENT) surgery is considered a risk factor for difficult intubation, moreover thyroid surgery.
**References:**
1. Martín Jaramago et al. Monitoring of recurrent laryngeal nerve injury using an electromyographic endotracheal tube in thyroid and parathyroid surgery. Anesthetic aspects. Rev Esp Anestesiol Reanim. 2013 Dec;60(10):576-83.
2. Lu IC et al. Optimal depth of NIM EMG endotracheal tube for intraoperative neuromonitoring of the recurrent laryngeal nerve during thyroidectomy. World J Surg. 2008 Sep;32(9):1935-9.
3. Tahery J, Natt RS. Fibre-optic laryngoscope and endotracheal tube assembly: how we do it. Clin Otolaryngol. 2010 Aug;35(4):327-9.

## 16AP03-5

### Fully immersive simulation improves confidence in dealing with a tracheostomy emergency in junior medical and nursing staff

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**Background and Goal of Study:** The National Tracheostomy Safety Project (NTSP)[1] was launched to improve tracheostomy management and contains emergency tracheostomy management algorithms. For ward based tracheostomies, junior doctors and nurses are likely to be first responders to an emergency before skilled airway help arrives. We assessed the impact of a fully immersive simulated scenario of a tracheostomy emergency on candidate's confidence levels.
**Materials and methods:** Candidates worked through the NTSP algorithm in a fully immersive simulation of a distal tracheostomy blockage. Following this, they undertook a video assisted debrief with a micro-teach session about tracheostomies and the NTSP algorithm. They then completed a 4-point questionnaire, marking their answers on a 10cm line, measured to 1mm, to quantify response. The questions asked are detailed in the results table.
**Results and discussion:** Most candidates reported a low level of tracheostomy training prior to attending the course (mean 1.9, range 0 to 8.8). There was a mean increase in confidence of 3.8 (range of -0.7 to 7.0) with only one candidate reporting a decrease in their confidence. All candidates felt that simulation was a useful modality to rehearse and train for a tracheostomy emergency reporting a mean of 9.7 (range 8.6 to 10).

| | Nurse (n=6) | Doctor (n=6) | Combined (n=12) |
|---|---|---|---|
| *Prior to the scenario, how much teaching/training in managing a tracheostomy do you feel you have had?* | 3.1 | 0.7 | 1.9 |
| *Do you feel simulation is a useful too for training and rehearsing this particular emergency?* | 9.9 | 9.7 | 9.7 |
| *Prior to the scenario, how confident did you feel in managing a tracheostomy emergency?* | 5.0 | 0.8 | 2.7 |
| *After completing the scenario and debrief, how confident would you feel in managing a similar scenario in your clinical practice?* | 6.8 | 6.2 | 6.5 |

*[Questionnaire Results]*

**Conclusion(s):** Multi-disciplinary fully immersive simulation with a video assisted debrief is an effective way of improving the confidence of junior doctors and nurses in managing a ward based tracheostomy emergency. This simple educational modality could be incorporated into trust inductions for new starters and could improve patient safety.
**Reference:**
1. National Tracheostomy Safety Project http://www.tracheostomy.org.uk Accessed 18/11/15
**Acknowledgements:** We would like to thank Mr Neil Rimmer, Mr Mark Murphy and Dr Dominic Pickles who helped to design the scenario.

## 16AP03-6

### Combined DATC and DSTC course, 2 years of experience

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**Background and Goal of Study:** For the second time this year we organize a combined international master class on trauma care. We offer both the anesthetic version (the Definitive Anesthetic Trauma Care (DATC)) and the surgical version of the course (the Definitive Surgical Trauma Care Course (DSTC)).
**Materials and methods:** Both courses are being organized under auspices of the Madrid`s Regional Anesthesia Society in close cooperation with the Spanish Association of Surgeons. Both courses are integrated and for more than 75 % combined. Also we introduced the ‚fire side discussion'' format, pre planned case scenarios discussions, supervised by a DSTC and DATC faculty member. Surgeons and anesthesiologists join in the practical sessions on the cadaver laboratory and the animal laboratory.
In the latter we have implemented the team concept, in which surgeons, anesthesiologist, scrub-nurses are working together, applying Crew Resource Management principles.
**Results and discussion:** The complete course, including all practical sessions and fireside discussions has been highly evaluated each year, making this course a good option and broadest trauma course ever, following initial management principles based on European Society of Anesthesiology ETC course (European Trauma Course) and Advanced Trauma Life Support (ATLS) course.
**Conclusion(s):** Team approach, advanced life support and decision making are practiced throughout the course. Trauma management course is intended to provide all target groups with an acceptable method of safe management, knowledge and skills, necessary to take care of the critical injured trauma patient.
**Reference:**
1. Information on website: http://www.aecirujanos.es/patrocinados_por_la_AEC/cursosDATC.php (Spanish)

## 16AP03-7

### Internationalisation of Simulation-Based Medical Education (SBME); a prospective realist evaluation of a programme conducted in two culturolinguistic environments

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**Background and Goal of Study:** Medical education is increasingly international. Moreover, both medical practice and concepts of educational processes appear to be more consistent across cultural and linguistic boundaries.[1] SBME is well established in the UK. Our successful London-based 'Train the Trainer' courses for medical teachers who wish to use SBME attracted interest from a group in Greece who had established a new medical simulation centre at their hospital. At the group's request we developed a Greek version of our course. We sought to evaluate it, recognising the limitations of conventional questionnaires, by using a Realist approach.[2] Realist Evaluation recognises that programmes operate in complex social contexts and are inherently theory-based.
**Materials and methods:** Following a literature search, focus group meetings with the UK facilitators, videoconferences with the Greek facilitators and a pre-course survey/learner needs analysis, we re-examined our current programme and tried to configure how its different components in terms of contexts, mechanisms and outcomes would work in a new setting. Differences in domains such as innovation, resources, institutional and environmental factors and measures were evaluated using a Realist approach.
**Results and discussion:** Differences in the educational landscape and the structure of training, inexperience with SBME, limited resources available (simulation centres, administrative and managerial support, arranged time-commitments), and lack of explicit funding shape the mismatch identified between the two settings. Our findings influenced the content and structure of the new programme. Experiential learning, simulations and highly interactive workshops, 1:1 mentoring, facilitation and debriefing skills, scenario design, mobile simulation, follow-up arrangements and development of collaborative networks represent the theoretical underpinning of our new programme.
**Conclusions:** What works in one location may not work in another. What works, for whom, how, under what circumstances and in what respects are some of the important questions to think through before transferring success in the effectiveness of learning from one setting to another. Realist Evaluation offers a better understanding of outcomes of international transfer of medical education programmes.
**References:**
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2. http://www.communitymatters.com.au/RE_chapter.pdf

## 16AP03-8

### Retention of extra-motivated students who underwent learning by doing concept in anaesthesia and intensive care medicine

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**Introduction:** Recruitment of extra motivated students for clinical practice is considered as an important goal for every undergraduate medical teacher. Our aim was to highlight the importance of application of the concept "learning by doing" for recruiting the graduates of Medical Faculty of Masaryk University (MFMU) for Anaesthesia and Intensive Care Medicine (AIM) specialization.
**Methods:** The subject "Individual Student Project" is obligatory part of pregradual curriculum of MFMU and is mandatory for registration of final exams. Since the year 2010 topic "The development of multimedia educational portal AKUTNĚ.CZ" has been offered. Objective was development of supportive material for PBL/TBL lectures aimed at acute medicine. We performed the evaluation focusing on choice of profession and specialization in medicine in December 2015. Data were reported descriptively (MS Excel 2007, Microsoft, USA).
**Results and discussion:** We evaluated 99 graduates who passed our topic "Individual student project" in the period 2010 - 2015. During this period they developed up to 53 electronic Virtual Patients in the form of interactive multimedia algorithms (available on: http://www.akutne.cz/index-en.php?pg=education--interactive-algorithms). 34 graduates (34.3 %, 39.5 % from 86 in overall clinical field) work in AIM specialization. 52 graduates (52.5 %, 60.5 % from 86 in overall clinical field) work in other clinical field of medicine. Four of them (4.0 %) work in non-clinical medical specialization. We don't have response from 9 graduates (9.1 %). There were 47 459 physicians in Czech Republic (CZ) in 2013. In AIM worked 2 932 (6.2%) of them. Trainees before full attestation in AIM were 1 003 and 410 of them were young trainees before root exam in AIM up to 2 years from graduation. Approximately one third of extra -motivated students retained in AIM specialization after graduation and helped extend number of physicians in AIM in CZ. Since 2010 our graduates formed 8.3% of young trainees in CZ and 3.4% of all trainees in AIM specialty.
**Conclusion:** The concept "learning by doing" brought more than 85% retention of physicians in clinical specializations and more than 33% in AIM specialization after graduation. This concept could be considered as important motivational element for AIM choice after graduation.

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